Environmental Studies

for Class V

A Textbook of Science for the Children of Ladakh









Published by

J&K State Board of School Education

for

Operation New Hope

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CLASS 5 SCIENCE

རིག་འཛིན་དཔལ་འབར།
RIGZIN SPALBAR

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Foreword

Education is the number one priority of the Ladakh Autonomous Hill Development Council—Leh (LAHDC), and one of the first steps in this direction is to make available to the students locally relevant textbooks which please as well as they teach.

Science is better understood by observation and more so when children can relate their own surroundings and environment to what they read in their textbooks.

The science textbook for the 5th class is ready and I have gone through it. The book is simply written, clear, comprehensive, interesting, and most of all it is Ladakh- appropriate. Each chapter has been developed as a self-contained unit of study that may be used in any sequence the instructor wishes. Numerous illustrations have been introduced wherever necessary. This I feel will make students thoughtful viewers; at the same time it teaches them to be thoughtful readers.

The team of dedicated teachers from Education Department LAHDC, Leh and SECMOL have developed this book in collaboration with the Jammu and Kashmir State Board of School Education. The Ladakh Autonomous Hill Development Council, Leh has actively supported it from the very beginning.

I am sure this book will find an encouraging response from the children, parents, and teachers.

I would like to thank the teachers, SECMOL, J&K Board and all other people involved in the development of this book.

Rigzin Spalbar

Chairman/CEC

Preface

Ladakh is bestowed by nature with high mountain ranges, lofty cliffs, elevated plateaus, rocky gorges, and difficult passes. It is a vast territory with desert of rock and sand characterized by its rugged topography. This text book is designed to present a true and fair view of environmental education, which is a compulsory part of school curriculum. It inculcates scientific mind-set characterized by the spirit of enquiry, problem solving, and understanding nature in its totality and the like.

The textbook, Environmental Studies (Science for Class 5), is a modest venture to study science by observance, adherence and obedience. The subject matter of this book for class 5th has been divided into eleven chapters with a view to help students to read and understand by a spirit of enquiry coupled with a scientific temper. The book has been prepared, developed and constructed by the eminent members of SECMOL, local teachers, and prominent citizens of Ladakh. Is is, no doubt, based on anatomy, pollution, planets, environment and ecology that surrounds them. The untiring efforts of the organizations and individuals under the LAHDC, Leh, engaged in the process are creditable and praiseworthy.

The Jammu and Kashmir State Board of School Education is indeed, happy to produce this book for "Operation New Hope" for the children of Ladakh. Dr. Bashir Ahmad, Director (Academics) J&K BOSE and his team deserve admiration for conducting the corrections, review and revision of this text book.

Sd/-
Prof. N.A. Ghani
Chairman,
J&K BOSE,
Srinagar

Notes for the Teacher

Chapter 1: The Respiratory System

Why this chapter?

In class 4, students have already been introduced to some internal organs of the body and also to the digestive and skeletal systems. In this chapter, we discuss another major system – the respiratory system, which is vital for the functioning of the human body. The purpose of this discussion is to give students knowledge about the process of breathing and the function of the lungs. The students also learn how important it is to protect the lungs from such environmental hazards as pollution and smoking. The chapter lays the groundwork for some of the later lessons on health issues that include the discussion of diseases specific to the dusty environment of Ladakh.

The purpose of the respiratory system is to supply oxygen to our body. As a teacher, it is important to check before beginning the chapter whether students remember that all living things need oxygen to survive. Interestingly, plants are the only living organisms that during the day, take in carbon dioxide and give out oxygen. This is because they require carbon dioxide for photosynthesis (photosynthesis is the process by which plants produce their own food, which has already been taught in class 4) and the chemical reactions involved produce oxygen as a by-product which is released into the atmosphere.

What else you can do

In order to demonstrate how the diaphragm causes the lungs to expand and contract, take a plastic bottle and cut off its bottom. Take a rubber band and tie the lower part of the cut bottle with an airtight plastic bag. Attach a balloon to the upper end of the bottle in such a way that it hangs inside the bottle. Make sure both ends are airtight. When we pull the plastic bag outward, air gets sucked in to the balloon due to expansion of space in the bottle cavity. As a result, the balloon expands. When we push the plastic bag, the space in the bottle cavity decreases so the air inside the balloon is driven out and the balloon contracts. Our lungs work in a similar way.

While presenting the lesson, draw a vivid diagram of the lungs and their various parts on a drawing sheet.

Materials Needed

For students to measure chest expansion:
- a measuring tape or string for each pair of students.

For the demonstration of the diaphragm:
- a plastic bottle,
- balloon,
- airtight plastic bag,
- rubber band
- a knife

Chapter 1
THE RESPIRATORY SYSTEM

"Hello everybody! How are you?" Hussain's left lung called out suddenly, surprising everybody in the classroom. The teacher and all the students looked up wondering who had spoken.

Hussain's left lung spoke again from inside his chest. "Don't look so confused. Let me introduce myself. I'm Hussain's left lung." Hussain was shocked and jumped up. He didn't know what to do. "Is this really happening or is it all a big joke?" he thought.

"Don't panic, Hussain," his left lung continued. "I saw your science teacher preparing to teach a chapter on the respiratory system. So I thought I should help her. We lungs are best suited to tell you how the respiratory system works. We are an important part of your respiratory system. Don't worry, this is not going to hurt you at all."

Hussain was shocked and couldn't say anything, but the other children were excited.

Angmo said, "Tell us about your work."

"Before I tell you that," said the left lung, "Let's do some simple activities."

Hussain's lung continued, "Now let's do one more activity. For this one, each student needs a partner. You will also need a measuring tape or string."

Take in a deep breath. Now slowly breathe out. Hold a finger under your nose to feel the air that is breathed out.

How does it feel when you breathe in and when you breathe out?

What is the difference?

Ask your partner to put his hands on his head. Tell him to take a deep breath and hold it. Use a tape or string to measure his chest size. Write down the measurement or mark the string.

Ask your friend to slowly breathe out. Then measure his chest again.

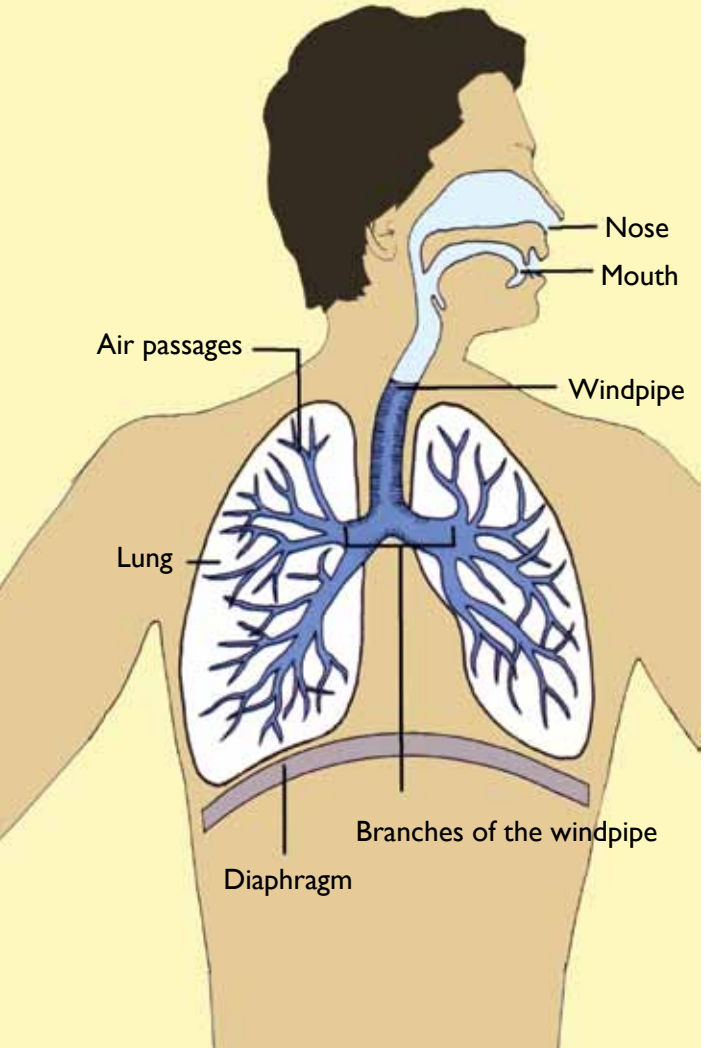
What happens to his chest when he breathes in? Does it expand or contract?

What happens to his chest when he breathes out? Does his chest expand or contract?

Angmo said, "Now we know that the nose and the chest are involved in breathing. But why do we have to breathe, and what exactly happens when we do?"

The lung explained, "When you breathe in, you take in air rich in oxygen, a gas you need to stay alive. When you breathe out you get rid of carbon dioxide, a gas the body makes. Taking oxygen in and getting rid of carbon dioxide is the job the respiratory system. I am part of this system.

The Respiratory System

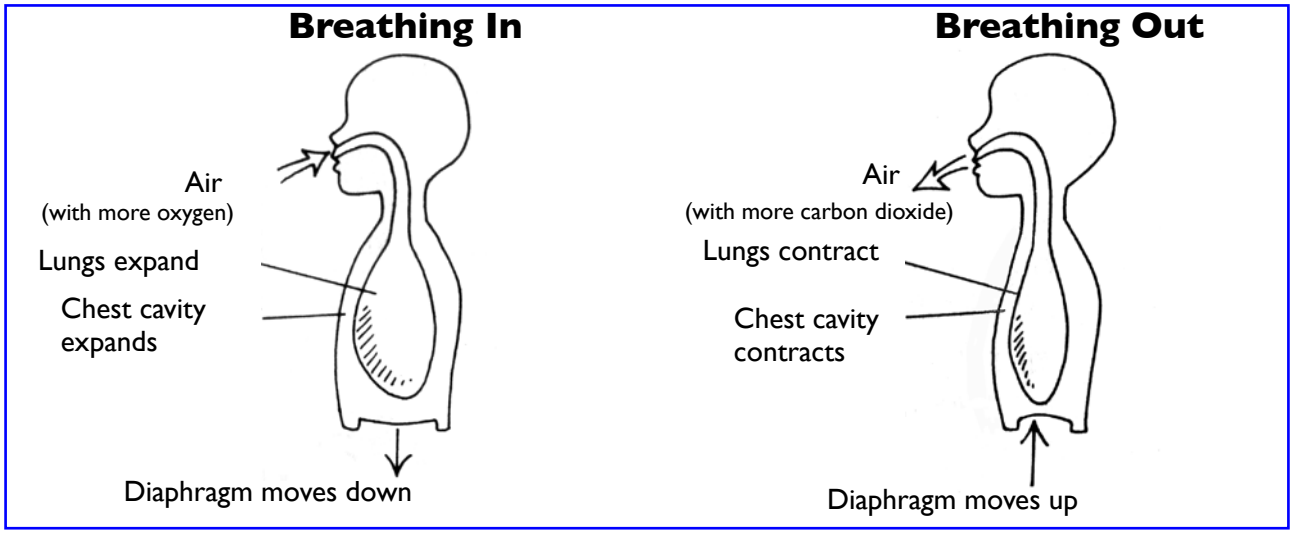


"Come, let's take a closer look at the whole respiratory system. While I describe this to you, point to the parts on the diagram. Let's start with the nose. This is the door to your respiratory system. The hair inside the nose stops some dust from getting into your lungs. The nose leads to the windpipe, which runs from the throat into the chest. In the chest the windpipe divides into two. One tube goes to the left lung, the other to the right lung. We lungs are foam-like structures inside the chest. Inside us these tubes spread out into many branches that end in many very tiny balloon-like alveoli. Don't they look like an upside-down tree with alveoli as leaves? Just below us lungs is a thick sheet of muscle called the diaphragm which moves up and down to make us breathe. All of us together form the respiratory system."

"But what work do you do together?" asked Ahmed.

"Do you remember what you read in classes 3 and 4? You read that air is a mixture of different gases. One of the gases in the air is called oxygen. Every part of your body needs oxygen to live and work. When you breathe in, air containing a lot of oxygen enters your body through your nose and mouth. Then it goes into your lungs through the windpipe and its branches to the alveoli. Here the air meets your blood. The blood takes up a lot of the oxygen, and then flows to all parts of your body. Your body uses the oxygen to live and work. This produces another gas called carbon dioxide. The body doesn't need much carbon dioxide, so the blood carries it back to the lungs. The lungs get rid of it in the air you breathe out. So we lungs are the place where oxygen from the air enters your body and carbon dioxide leaves it. That is our real job."

"So is the air we breathe in all oxygen, and the air we breathe out all carbon dioxide ?" Angmo wanted to know.



Hussain's lung laughed. "No, no, the air you breathe in and the air you breathe out are both a mixture of gases. Both have oxygen, carbon dioxide, and other gases in them. But the air you breathe in has more oxygen and less carbon dioxide than the air you breathe out."

"Now you know how important we lungs are but we are also easily hurt so you should look after us."

The children asked, "How should we do that?"

"Have you ever noticed that after being in a smoky room or near a dusty road you get dirt in your nose? Some of this dirt gets right down into me. This is awful. It hurts my airways, but especially my tiny alveoli. It makes them black like a chimney pipe. Can you imagine how I am hurt if a lot of cigarette smoke gets into me? Even being near someone who is smoking can harm my little alveoli. If I breathe a lot of dust I can get a disease called silicosis. Hussain tries to protect me by wearing a thick scarf over his nose and mouth when he is working on a dusty day."

Hussain started to look a bit proud of himself now.

Angmo said, "Thank you! Now I understand how our lungs work."

Ahmed added, "I'll never smoke! I think people who smoke are stupid, don't you? They just spend money to get diseases."

Hussain's lung said, "Yes, I'm glad you understand. Now I'll keep quiet and let your teacher teach the class. Good-bye!"

The children cried, "Thank you and good-bye!"

EXERCISES

I Answer the following questions:

1. Name the five main parts of the respiratory system. What work does this system do?
2. How many lungss do we have and where are they in our bodies?
3. Which organ is the door to the respiratory system?
4. What is the diaphragm? How does it help during respiration?
5. What is the main function of the lungs?
6. What is the difference between the air that we breathe in and the air that we breathe out?
7. How can you keep your lungs healthy?

II Fill in the blanks with the words given below:

diaphragm carbon dioxide expand cigarette smoking

1. When we breathe in, our lungs _ _ _ _ _ _ _ _ .
2. Taking in oxygen ansd getting rid of _ _ _ _ _ _ _ _ _ is the job of the respiratory system.
3. The _ _ _ _ _ _ _ _ moves up and down to make us breathe.
4. _ _ _ _ _ _ _ _ can harm our lungs.

III Match the two columns:

i.	Our lungs expand	a)	are called lungs
ii.	The windpipe and its branches	b)	is taken by the blood to other parts of the body
iii.	Some of oxygen that we breathe in	c)	to let the air come in
iv.	The foam-like structures in the chest	d)	require oxygen to live and work
v.	Our bodies	e)	carry the air from the nose to the alveoli and back

VOCABULARY

chest	བྲང་།
to call out	འབོད་བྱས། ཀུ་ཇོ་གཏང་བྱས།
to be shocked	འདྲོགས་ཆ་བྱས།
to be confused	ཤ་མ་གོཏ་མགོ་འཁོར་བྱས།
to panic	འདྲོགས་ཏེ་རྟི་ལིངས་ཐོར་བྱས།
to be suited	འཚྭོད་བྱས།
to be excited	སྐྱིད་པོ་ཚོར་བྱས།
to expand	ཆེན་ཨོ་ཆ་བྱས།
to contract	ཆུང་དུན་ཆ་བྱས།
to get rid of	ཕིངས་གཏང་བྱས། མེད་མཁན་བྱོ་བྱས།
to take a closer look	རྒྱལ་བ་བྱོས་ཏེ་བལྟ་བྱས།
foamlike	ས་བོན་གྱི་ལྟུ་བ་ཅོཏས།
ballon	གློད་བུ་ཅེ་ལེ།
chimney	ཐབ་ཀྱི་སུ་རི། དུད་པ་ཆ་སཁེ་སུ་རི།
to require	དགོས་ཤས།

Notes for the Teacher
Chapter 2: The Circulatory System

Why this chapter?

This chapter discusses how the heart, along with an intricate network of arteries, veins and capillaries, keeps our body functioning by providing oxygen and nutrients to all parts of the body. The chapter also explains the close relationship between the circulatory system and the respiratory system. Thus the students reach a broader understanding of the interdependence of the various systems of the body and of how the failure of one would possibly lead to the collapse of all.

Extra information for the teacher

It should be kept in mind that the chapter is an introductory discussion of the circulatory system and does not include a detailed explanation of the reason why it important for blood to reach all the parts of the body.

As a teacher, one should keep in mind that blood carries oxygen and nutrients, which are converted into energy by individual cells and used by the various organs and body parts to perform their necessary functions. As a car has to be regularly refilled with fuel which it burns as energy to keep it going, our body parts have to be constantly supplied with oxygen and nutrients to get energy to keep working.

Note: When you have the children count their own or each other's pulse rate and heart beat, you should hold a watch or a clock and announce the start and stop times. If you find that children can not sit quietly and count for a whole minute, have them count for half a minute and then double the results.

Materials Needed

To count the pulse or heart rate, you must have a clock or watch with a second hand.

Chapter 2
THE CIRCULATORY SYSTEM

How do you get from your village to the nearest big town? You probably travel on a bus or motorcycle. Buses and motorcycles run on roads. Inside the village you have roads, and paths to go from house to house. These roads, paths, and the vehicles moving on them are the transport system of Ladakh. A transport system helps you move from place to place and take things from place to place.

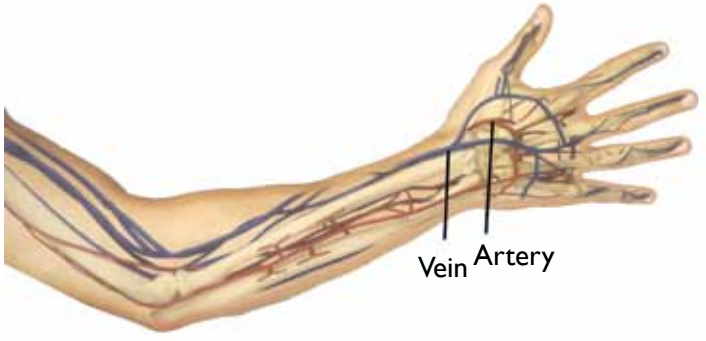
Our bodies have a transport system too. Every part of our body needs nutrients and oxygen to live and grow. Our bodies make carbon dioxide and other wastes, and need to get rid of them. All these are transported through our body in tubes called blood vessels. The system that carries oxygen, nutrients and wastes including carbon dioxide in our blood is called the circulatory system. Let's see some of these blood vessels.

Activity 1

Place your hand on the floor and wait for a minute. Can you see some thin bluish blood vessels in the back of your hand?

(On some children's hands the blood vessels may be difficult to see, so you may want to look at your teacher's hand instead.)

The blood vessels you see are called veins. There are other kinds of blood vessels in the circulatory system called arteries. Arteries and veins spread all over the body. Arteries and veins are joined to one another by a huge number of very tiny tubes called capillaries. Arteries, veins and capillaries act as the roads and paths of the body's transport system. We will learn more about them later.



The capillaries are too small to be shown

What is carried in the arteries, veins and capillaries? There is a red liquid in our body. When you cut yourself you bleed. Do you know the name of this liquid?

It is called blood. Our blood carries nutrients and oxygen to all parts of the body and takes away carbon dioxide and other wastes.

How does blood move through the arteries? It moves because it is pumped by the heart. The heart pumps all your life. Do you know where your heart is?

The Human Heart

Activity 2

Some boys should take off their shirts. Students should take turns to place their ears on the lower left side of their friend's chest. You should hear a regular beating sound. This is the sound of the heart.

With the help of a watch or clock, carefully count the number of heart beats in one minute.

The number of heart beats per minute is _____.

Activity 3

Every time your heart beats, blood is pumped into your arteries. You can feel this pumping as a pulse in your arteries. Each pulse is from a beat of your heart.

Now place your fingertips on the inner thumb side of your wrist. Press your wrist lightly until you can feel the pulse. Count the number of beats in one minute.

My pulse rate is _____.

When you are unwell, the doctor may check your pulse rate to see if your heart is beating normally. The normal pulse rate of an adult is about 70 beats per minute when sitting quietly. Children usually have a faster rate.

Check the pulse rate of your teacher and find out how different it is from yours!

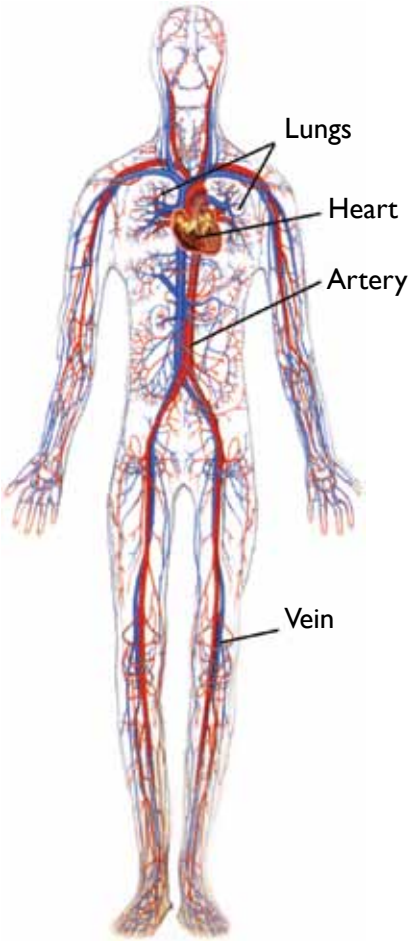
Jump up and down ten times and then check your pulse rate again.
After jumping, my pulse rate is_____.
Is it more than before? When you exercise your heart will pump faster.

The heart rate increases with activity because your body needs more oxygen and nutrients when you are more active. The heart beats faster to move more blood with oxygen and nutrients to the muscles that are being used.

Arteries always carry blood from the heart. Veins carry blood back to the heart.

The heart, arteries, veins and capillaries together are the circulatory system.

The Circulatory System

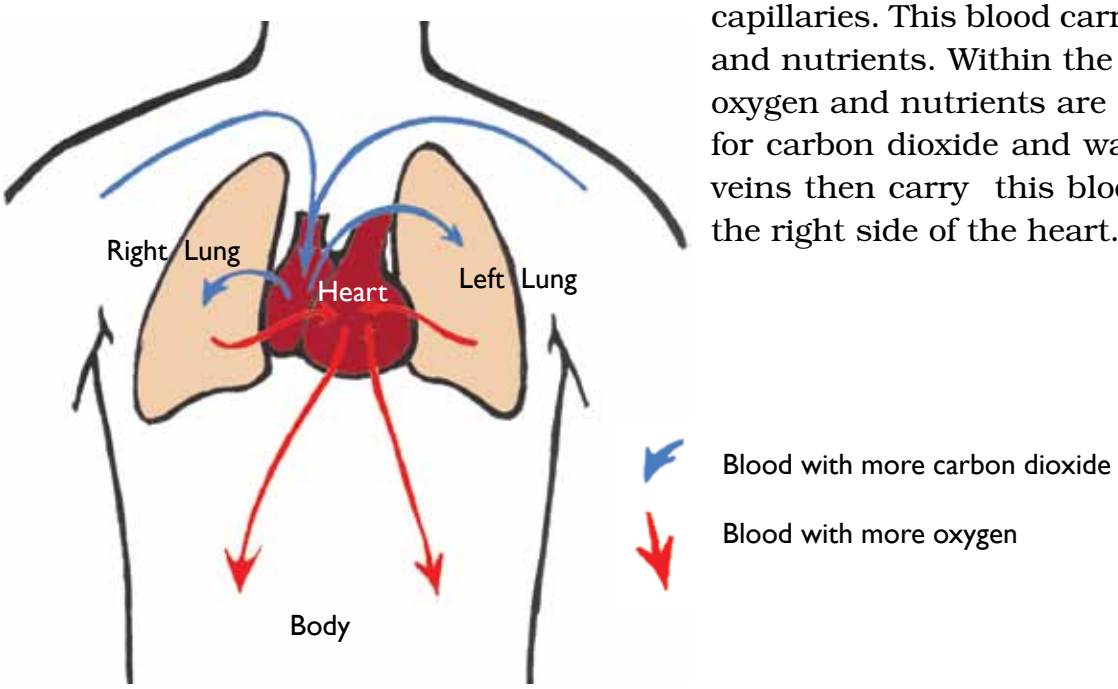


Relationship between Respiratory and Circulatory Systems

The respiratory sytem and the circulatory system are closely linked.

As you read, follow the path of the blood in the diagram. Start from the right side of the heart and follow the arrows. The right side of the heart pumps blood to the lungs where it flows through capillaries in the walls of some 600 crore alveoli. Here the blood gets rid of carbon dioxide and takes up oxygen. The oxygen-rich blood goes back to the left side of the heart. The left side of heart then pumps this oxygen-rich blood to the rest of the body, where it is used.

The left side of the heart pumps blood to all parts of the body except the lungs. Every time it beats, it pushes blood into the arteries, which carry the blood to capillaries. This blood carries oxygen and nutrients. Within the capillaries oxygen and nutrients are exchanged for carbon dioxide and wastes. The veins then carry this blood back to the right side of the heart.



EXERCISES

I Answer the following questions:

1. Name the parts of the circulatory system.
2. Which organ of the circulatory system acts as a pump? Why is it important?
3. What are the differences between arteries, veins and capillaries?
4. What is the function of the circulatory system?
5. Why are the circulatory system and the respiratory system linked?
6. What is the normal pulse rate of an adult? What happens with activity?

II Fill in the blanks using the words given below:

arteries, nutrients, blood, oxygen, veins, capillaries, lungs, bodies, heart

1. Our blood runs through _ _ _ _ _ _ _ _ , _ _ _ _ _ _ _ _ _ _ _ _ and _ _ _ _ _.
2. Blood carries _ _ _ _ _ _ and _ _ _ _ _ _ _ _ _ to different parts of our body.
3. The blood takes in oxygen from the _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _.
4. The _ _ _ _ _ _ _ _ _ is a pump, which pumps _ _ _ _ _ _ _ continuously.
5. Our _ _ _ _ _ _ _ _ _ _ _ need nutrients and oxygen to live, grow and work.

III Who am I?

1. I pump blood to different parts of the body.

   I am the _ _ _ _ _ _ _ .
2. I supply the blood with oxygen.

   I am the _ _ _ _ _ _ _ .
3. I carry oxygen-rich blood to different parts of the body.

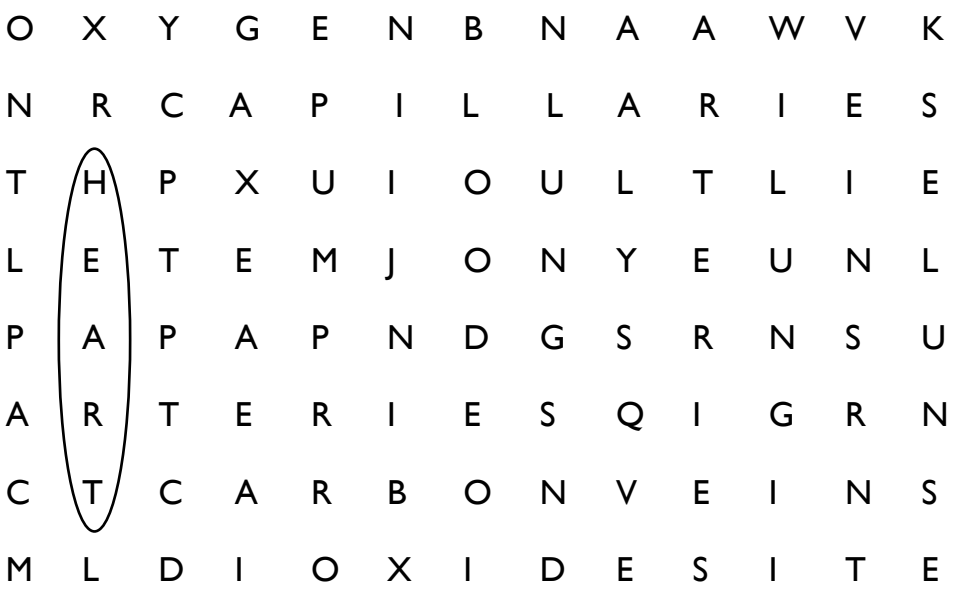
   I am the _ _ _ _ _ _ _ .
4. I carry blood with carbon dioxide and other wastes from different parts of the body.

   I am the _ _ _ _ _ _ _ .
5. We are the tiny tubes that connect arteries and veins.

   We are the _ _ _ _ _ _ _ .

Things to do

In the word game below, find nine different words related to the circulatory system. They read left to right or top to bottom. Some appear more than once.



VOCABULARY

vehicle	སོ་ཁོར་འཁོར་ལོ།
tube	པུ་རི།
blood vessels	ཁྲག་རྩ།
capillaries	ཁྲག་རྩ་ཐུ་མོ།
to bleed	ཁྲག་འཕིང་བྱས།
heart beat	སྙིང་བརྡུང་བྱས།
to link	འབྲེལ་ཏེ་ཡོད་བྱས།
pulse	ཁྲག་རྩ་འཕར་མཁན་གྱི་སྐད།
artery	སྙིང་གྱི་ཕྱོགས་ནས་གཟུགས་པོའི་ཡང་ཁག་ཀྱན་ལ་ཁྲག་འཁྲེང་མཁན་གྱི་ཁྲག་རྩ།
vein	གཟུགས་པོའི་ཡང་ཁག་ཀྱན་ནས་སྙིང་གྱི་ཕྱོགས་ལ་ཁྲག་ལོག་ཏེ་ཆྱོང་མཁན་གྱི་ཁྲག་རྩ།

Notes for the Teacher

Chapter 3: Communicable Diseases

Why this chapter?

This chapter introduces children to relevant health issues faced in Ladakh. The diseases covered are diarrhoea, worms, colds and flu, tuberculosis, malaria, and rabies. All of these, except malaria, occur in Ladakh. Malaria is included because it is commonly found in most other parts of India and it is important that Ladakhi children should have a general awareness of it. The chapter discusses the causes, symptoms, treatment and prevention of most of these diseases. It is vital that the children understand each of these.

Communicable diseases are diseases that can spread from one person to another. The teacher should ensure that children completely understand the different ways in which germs can be transmitted and can be prevented from getting transmited, so that they can be more active in safeguarding their own health. Most of these diseases are common in Ladakh and can be easily prevented.

Extra information for the teacher

The chapter includes only a very brief discussion of malaria and rabies. It might be useful to keep some additional information about these diseases handy.

Malaria is a disease of the blood caused by the Plasmodium parasite. The first symptom of malaria is often violent shivering followed by a fever. The fever usually comes and goes and is accompanied with headaches and muscle aches. If the disease has already been transmitted, medicine can cure it although sometimes the patient has to be hospitalised.

Rabies is a viral infection of the brain that mostly affects animals, eg. dogs, cats, foxes. If it is transmitted to a human and left untreated, it produces symptoms such as depression, paralysis and hydrophobia (fear of water) after several days. There is no medicine to cure the patient after he has already got symtoms of rabies, so prevention is essential. Make sure that children in your school know to wash any animal bite immediately with soap and water. If the animal appears to be mad, take the person to a doctor to get vaccinated, which can help prevent the disease.

As a class activity, initiate a discussion with the students on home remedies for some common communicable diseases. Some of these practises may be very effective, but are being forgotten by the younger generations.

What else you can do

1. The teacher should encourage healthy habits in school, for example washing hands before eating, ensure that children cut their nails short, use a handkerchief while coughing or sneezing, and washing any wound or animal bite with soap and water. Make sure there is a hand-washing facility with water and soap always available in your school.
2. Make some ORS solution in school so that every one knows how to make it and approximately how it should taste. Make sure that they understand that this is something they can and and should do whenever necessary in their homes.
3. The text has been presented in a conversational format. Dramatise the text where the children memorise the lines and play the part. This will serve the dual purpose of understanding the subject matter clearly, and also help develop language skills.

Materials Needed

You will need chart paper for the class activity mentioned above to list the diseases with their home remedies.

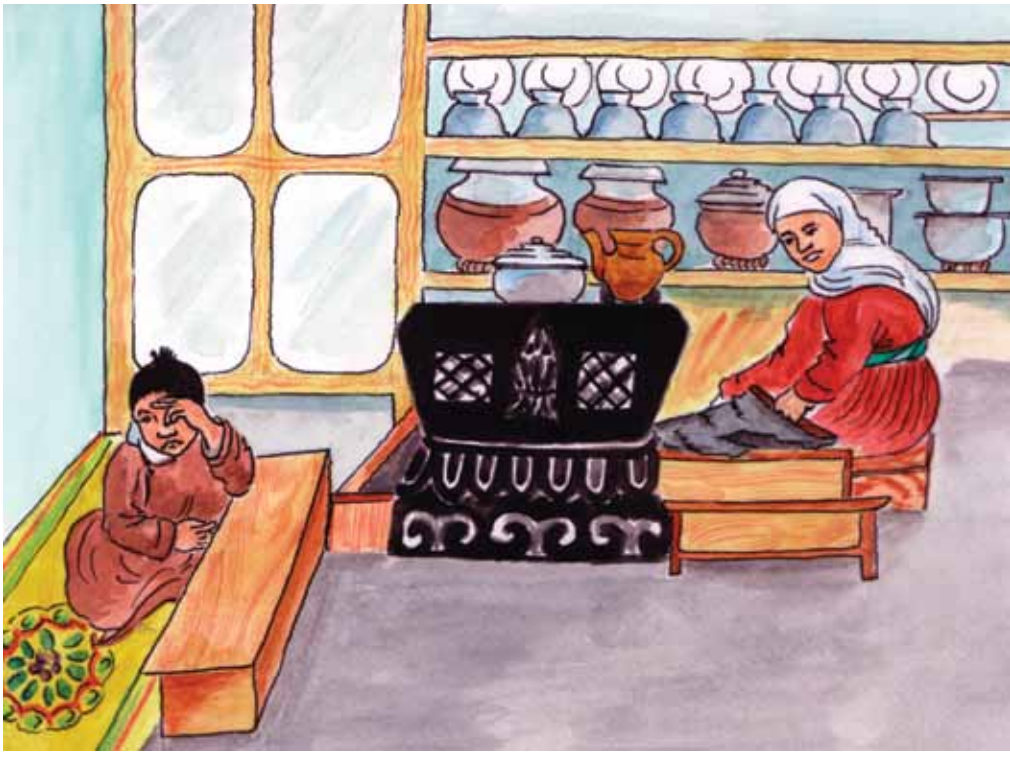
Chapter 3

COMMON COMMUNICABLE DISEASES

Communicable diseases are diseases that are caused by germs that get into water or food, often from faeces.

Diarrhoea

Ali, Rinchen and Lobzang have not gone to school today. All of them are ill. Let's visit them to see why.



Ali: *Ama-ley,* I don't want to go to school today. I feel sick.

Mother: What's wrong?

Ali*:* My stomach hurts. I went to the toilet many times last night. I feel weak.

Mother: Why didn't you wake me up, Ali? Did you have loose motions?

Ali: Yes.

Mother: It seems you have diarrhoea. Something you ate may have caused it.

Ali*:* Oh, I feel so weak.

Mother *(as she lights the fire):* Let me make you a special drink that will make you feel stronger.

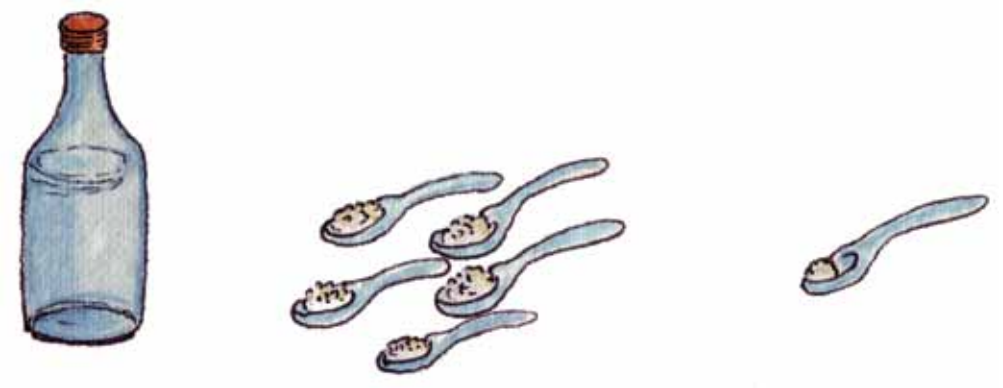
Ali*:* What drink is that, *Ama-ley*?

Mother*:* It is just water with sugar and salt. That's what you need now. You lost a lot of water and salt because you went to the toilet many times. So you are feeling weak. This will make you feel better.

Diarrhoea is common in Ladakh and all over India. When you have diarrhoea, it is better not to have spicy or oily food. When you have diarrhoea, you lose a lot of liquid from your body, which makes you feel weak. It can even be dangerous. Replacing the liquid in the body is important. Doctors have discovered that the best way to do this is with Oral Rehydration Solution (ORS). Also it is good to have rice soup or soup with wheat noodles.

The special drink for diarrhoea — Oral Rehydration Solution (ORS)

1. Boil one litre of water.
2. Add five teaspoons of sugar and one teaspoon of salt.
3. Mix well until the sugar and salt dissolve.
4. Let it cool.
5. The patient should drink one glassful of ORS for every time he or she goes to the toilet.



1 litre of boiled water + 5 spoons of sugar + 1 spoon of salt

For most cases of diarrhoea it is unnecessary to see a doctor. But you should see a doctor if:

- you are vomiting or cannot drink anything.
- you are not better after two days.
- there is blood in your faeces.

Worms

Some types of worms can live in our bodies, usually in the intestines. If you play or work in fields fertilised with human manure, or wear other peoples clothing, or use their bedding, the eggs of some worms can get onto your hands. You can't see the eggs but if you then lick your fingers or eat without washing your hands, you may swallow them. If there are many worms in your body, you can get stomach pain or feel itchy around your anus. If you then scratch your anus you may end up swallowing even more eggs. Worms can also make you lose weight or feel weak. Other worms, called tapeworms, can be caught from eating under-cooked meat, for example by tasting uncooked meat.

You can prevent worms from entering your body by washing your hands before eating, by keeping your nails clean and short, by washing vegetables well, and by never tasting under-cooked meat.

Pin worms

Roundworm

If you have worms, a doctor or *amchi* can give you medicine to get rid of them.

Many diseases spread when germs from one person's faeces get into other people's mouths.This is called faecal-to-oral spread.

When we eat food or drink water with faecal germs, we usually don't smell anything dirty. The germs are so small that we can't see them. For example, stream-water may look and smell perfectly clean, but if there is faeces upstream, it may have faecal germs in it. The germs can stay active in running water.

Faecal-to-oral spread can happen in many different ways. Mostly the germs get from faeces onto eating utensils, food or into water. We may get germs on our hands from the many things we touch: toilet doors, money, other people's hands. This is why we must all have good hygiene.

- Never go to the toilet into or near a stream.
- Always wash your hands after leaving the toilet.
- Always wash your hands before preparing food or handling eating utensils.
- Always wash your hands before eating.
- Keep food covered so that flies cannot land on it.
- If your water comes from a place where people may have made it dirty, always boil the water before drinking it. If you like drinking cold water, you can boil it and then cool it.

These steps are especially important for babies because their bodies are not good at fighting germs. So if you have baby brothers and sisters, make sure that they do not drink any unboiled water. Of- course babies cannot drink hot water, so let the boiled water cool. Around the world, many babies have died from diarrhoea caused by milk powder mixed with unboiled water.

Diseases that spread mainly through air

Colds and flu

Lobzang is lying in bed because she has a cold. She has a cough, a blocked nose, and a fever. Her baby sister Spalzes is playing on the bed too. Suddenly Lobzang coughs.

Mother: Lobzang, don't cough on your sister! Turn away and cover your nose and mouth when you cough!

Lobzang*:* Why?

Mother: If you don't cover your mouth and then wash your hands, your cold germs will spread to Spalzes and then both of you will be sick.

Lobzang*:* Okay. I'll cover my mouth whenever I cough.

Mother: Now, come wash your hands to get rid of the germs, and have some *thukpa*. Then you should rest for some time.

Cold and flu germs spread in the air when a sick person coughs or sneezes. They can also spread from person to person on hands and things hands touch. You can reduce the spread by covering your mouth and nose when you cough and sneeze and by washing your hands afterwards. There are no medicines to cure colds and flu so we have to get better naturally. Resting and drinking liquids like water, tea or soup helps. If the fever increases or continues for many days, it is better to see a doctor or an *amchi*.

Tuberculosis

Tuberculosis (TB) is another disease caused by germs that spread through the air. TB germs can affect any organ of the body like the lungs, brain or bones. Most commonly TB affects the lungs. A person with TB might lose weight, have fever, become weak, and cough a lot or even cough up blood.

Patients with TB can be completely cured with medicine. The doctor gives medicine for many months. The patient must take all the medicine the doctor gives even if he or she feels better. If they don't, then later they could become even more ill!

Some animals that bite also spread diseases!

Did you know that one kind of mosquito spreads a disease called malaria? This can happen if it bites you after it has bitten a person who has malaria. This kind of mosquito does not live in Ladakh, but it is found in most other parts of India.

A mosquito

Did you also know that the bite of a mad dog may give you rabies? The saliva of a mad dog may have the rabies germ in it. So if anyone is bitten by a dog, make sure the wound is washed very well with soap and water. This can prevent rabies in many cases. After washing the wound, take the patient quickly to a doctor to get anti-rabies injections. This is important because rabies kills people.

All the diseases mentioned in this chapter are communicable diseases. They are called communicable diseases because they are caused by germs that can spread from one person to another. Some diseases spread by the faecal-to-oral way. Some spread through the air and on dirty hands after people cough or rub their noses. Some are spread by the bites of animals or insects.

Our bodies try to fight these germs. With some diseases, like colds, flu, and diarrhoea, our bodies are usually able to get rid of the germs and we get better without medicine. But with other diseases like TB and rabies, most patients do not get better unless they take medicine to help them get rid of the germs.

Usually a person who has been eating a balanced diet will be stronger against germs. A person who does not have a balanced diet will fall sick more often and will take longer to get well.

EXERCISES

I Answer the following questions:

1. What is the best drink for a person who has diarrhoea?
2. How do we make ORS? Give the amount of each thing included.
3. Name some faecal-to-oral spread diseases.
4. How can we prevent faecal-to-oral spread diseases?
5. What should you do if a mad dog bites you?
6. Does a balanced diet help you fight germs?

II True or False? If the statement is false, correct it:

1. We should not have rice soup when we have diarrhoea.
2. We should go to a doctor if the diarrhoea does not stop after twodays, or if there is blood in our faeces.
3. Tuberculosis is not a curable disease.
4. We should cover our mouths when coughing especially when we have flu.
5. You can't spread colds or flu by using your unwashed hands to prepare food.
6. Worms spread from one person to another through the air.

III Match each disease with the main way it spreads:

Disease	Way of spreading
Diarrhoea	Through germs in the air
Malaria	Bite of a mad dog
Colds and flu	Bite of a mosquito
Rabies	Through germs in the air, on hands and things that have been touched
Tuberculosis	Faecal-to-oral

IV Rearrange the letters to form the name of a disease:

1. O E A R D H I A R
2. B I A R E S
3. R I A M A L A
4. U S I S R E B O L U C T
5. L U F
6. D S C L O

Things to do

Go to the Primary Health Centre in your village or invite the doctor to visit your school. Ask the doctor which communicable diseases he or she has treated in the past year. Ask for advice on how to prevent these diseases.

Fill up the table below and then copy it neatly onto a big chart for the class.

Name of disease	How it spreads	How many people got the disease	Prevention

VOCABULARY

loose motion	བྱོང་པ་བཤལ་བྱེད།
faecal	མི་གཙང་བའི།
utensils	ཅ་ལག་ཟངས་བྱ་སོགས།
hygiene	གཙང་སྦྲ།
noodles	གྲིམས་ཐུག རིམ་ཐུག སྲིམ་ཐུག
oral	ཁའི།
rehydration	གཟུགས་པོའི་ནང་ལ་ཆུ་གཙང་མ་སློག་སྟེ་གཏང་བྱེད་ཀྱི་ཐབས།
to dissolve	ཆུའི་ནང་ང་བཞུ་བྱེད།
to vomit	བསྐྱུག་བྱེད།
to spread	ཁྱེབས་ཤེས།
intestine	རྒྱུ་མ།
fertilised	ལྥད་གཏང་མཁན།
manure	ལྥད།
to lick	ལྤག་བྱེད།
itchy	འབྲན་བྱེད།
anus	ཙོ་ལོ། ཤ་ལོ།
to scratch	དྲད་བྱེད།
undercooked	ཞེད་འཚོས།
to cure	ཟླག་མོ་རྒྱལ་བཅུག་བྱེད་ཡང་ན་སྨན་དབྱད་བྱོ་བྱེད།
smell	དྲི་མ།
a cold	ཆམ་པ།
to cough	ཁོཏ་བྱེད།
fever	ཟླག་མོ་ཡོང་སྟེ་ཚད་ཆ་བྱེད།
to sneeze	ཁྲིད་ཡོང་བྱེད།
patient	ནད་པ།
to bite	སོ་བཏབ་བྱེད།
mosquito	ཟང་གི་ཙོག་པ་ཟཕམས་མཁན་གྱི་འབྱུ་ཅིག་ཅིག
malaria	ཚ་ནད་ཅིག
rabies	ཁྱི་སྨྱོན་གྱིས་སོ་བཏབ་སྟེ་ཡོང་མཁན་གྱི་ནད།
typhoid	ཚ་ནད་ཅིག
communicable	གཅིག་དང་གཅིག་ལ་འབྱུར་བྱེད།
curable	སྨན་དབྱད་བྱོ་ཉན་བྱེད་ཅན།
fatal	ཤི་ཆད།
hepatitis	ནད་འབྱེད་བྱེད་ཀེ་ཡོང་མཁན་གྱི་མཆིན་ཚད་དང་རྒྱ་ལ་མིག་སེར།

Notes for the Teacher
Chapter 4: Immunisation

Why this chapter?
This chapter discusses some of the most common communicable diseases of the world and how they have been or are being combatted by immunization. It explains the role of vaccination in training the body to win the fight against such dangerous diseases.The teacher should ensure that children understand the importance of timely and appropriate vaccination.

Extra information for the teacher
Discuss how prevention is better than cure, and link it to the role of vaccines, as well as the easy prevention methods in the previous chapter.

Some additional information about how vaccinations are made:

TB, measles and polio vaccines are made from tamed TB, measles and polio germs.

Whooping cough vaccine is made from killed whooping cough germs. Rabies vaccine is made from killed rabies germs.

Diphtheria and tetanus vaccines are made from diphtheria and tetanus germ poisons that have been treated so they can no longer cause the disease.

Meningitis vaccine, which is given to people who are going on the Hajj, is made from the skin of meningitis germs. Hepatitis B vaccine is made from the skin of the hepatitis B germ.

There are several diseases for which no vaccine has been found, such as the common cold, worms and most other stomach problems, Malaria, AIDS, and many others.

In 2004, the Health Department in Leh recommended the following vaccinations for children:

BCG: This vaccine partially protects against TB (tuberculosis). BCG is given by injection either at birth or at 1.5 months of age.

Polio vaccine: This vaccine protects against polio. It is given as drops at 1.5, 3, 4.5, and 16 -24 months of age. In addition the polio vaccine is given to every child under 5 years on Pulse Polio Days every winter.

DPT: This is a mixture of the 3 vaccines that protect against diphtheria, whooping cough and tetanus. It is given by injection at the same time as polio vaccine.

Measles vaccine: This vaccine provides several years protection against measles. It is given at 9 months of age. Both Measles and Chicken-pox are called *Chem-chem* in Ladakhi, but Measles usually comes with a high fever and can be dangerous. Chicken-pox comes with many small blisters and a milder fever.

DT: This is a mixture of two vaccines that protect against diphtheria and tetanus. It is given as a booster injection at five years of age

TT: This is a booster against tetanus and is given at 10 and 16 years of age. Two further doses are given to pregnant women. This vaccine may also be given to people, who because of dirty wounds, are at risk from tetanus.

Other vaccines such as hepatitis B vaccine, meningitis vaccine and rabies vaccine which are available but they are given to people with a special need.

What else you can do
Invite a doctor or the village health worker to visit the school and talk to the students about the importance of vaccination and the role of the Immunisation and Health Care Cards.

Have students ask their parents to show them their own Immunisation and Health Care Cards.

Chapter 4
IMMUNISATION

Sonam, who is ten, has come home to tell his mother and his younger brother what the teacher has told him. Vaccine has arrived at the clinic for all children aged between five and ten years. Tomorrow a health worker will vaccinate them. Sonam will be vaccinated against tetanus and his brother Lobzang who is nearly five will be vaccinated against both diphtheria and tetanus.

Lobzang: Ama-ley, why do we need to be vaccinated?

Sonam: Ama-ley, what are these diseases?

Lobzang: Ama-ley, will it hurt?

Mother*:* No, it won't hurt much. Your baby sister Jigmet has had ten vaccinations already. She didn't cry when she had her recent diphtheria, whooping cough and tetanus vaccination.

Diphtheria is an awful disease but it is preventable by vaccine.

Tetanus is a disease that people can get through dirty wounds. It's rare but very dangerous. But if you get the tetanus vaccine at the right times you will be protected against tetanus.

You children are very lucky that you get all these vaccinations nowadays.

But you know Tsewang, your uncle, who cannot play cricket very well?

Lobzang: Yes, Ama-ley, He has a bad limp.

Mother: When Tsewang was young he had a disease called polio. Polio made his leg short, thin and weak.

Also you might have noticed the shopkeeper in town who has a hunched back?

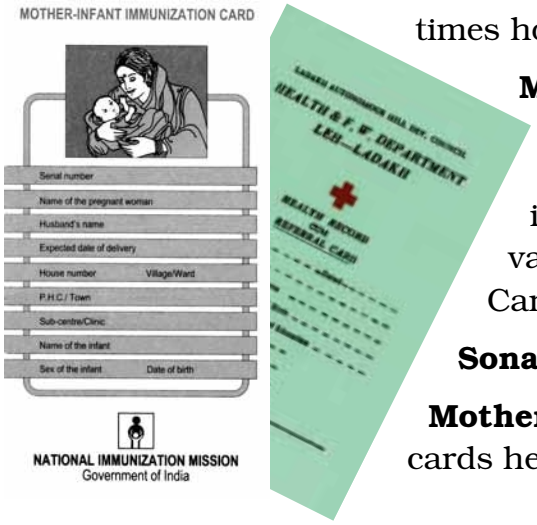
Sonam: Yes, I have seen him walking all bent over. He coughs a lot, too.

Mother: That's right. He had a disease called TB when he was a boy. TB caused both his cough and his bent back.

I may not have told you this before but I had an older sister who died at seven months. My mother told me, with tears in her eyes, that before my sister died she made a terrible noise fighting for breath, had an awful cough, and was blue from lack of air. She died from whooping cough.

You are so lucky that there are medicines now called vaccines that can protect you against these diseases. It is very important that you get each vaccine at the right age.

The government helps protect us now from these and other important diseases by giving vaccines.



Sonam: With so many different vaccines at different times how do you remember which one we need?

Mother: After you were born the doctor gave me an Immunisation Card for each of you. Whenever you had a vaccination it was written in your card. The card also said when your vaccinations were due. You also have Health Cards which we have to show if you go to hospital.

Sonam: But I don't have a Health Card!

Mother: Of course you do. Look, I've kept all of your cards here in this box.

Now come sit by me. I have one of the most wonderful stories to tell you. This is a science story about discoveries that have helped almost everybody in the world.

How I know this story is because I worked as a health worker when I was young.

Dr Chosphel told me that many scientists and doctors have searched for ways to prevent dangerous diseases. They discovered that germs caused many of these diseases. They did many experiments and worked hard for a long time to learn about germs, how they cause disease and ways of preventing these diseases. Now we know we can stop the spread of some diseases like diarrhoea by washing our hands after going to the toilet and again before preparing food or eating.

Scientists also found out how to prevent some of the worst diseases like measles, polio, whooping cough and TB by giving people special injections or drops. These

are called vaccines. Scientists have made a number of powerful vaccines, special ones for each disease.

Sonam: Ama-ley, I think these scientists are heroes.

Mother: Why?

Sonam: I think these scientists must have saved more lives than almost anyone else.

Mother: You may be right, Sonam. The only things that might have saved more lives are clean water supplies and good hygiene.

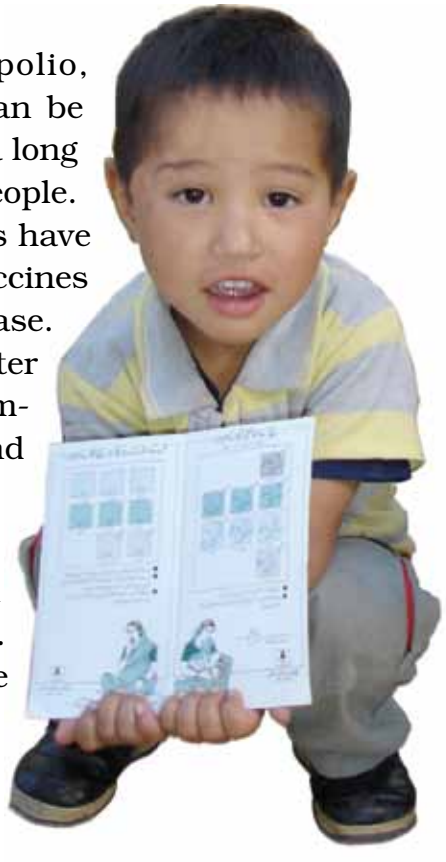
Now I will show you something that Doctor Chosphel gave me so I could explain to people about vaccines and immunity.

Immunity

In most cases when you catch a communicable disease such as measles, you are sick for a while and then you get better. If you get better this is because your body has won the battle against the germs that caused the disease. If the same germs attack your body again, the body's army of germ-fighting cells will remember the earlier battle and how they won that battle. This time your body will be better prepared to win, and the battle will be short. You probably will not even know that the germs attacked you. You will not get sick, because you will be immune to that type of germ. For example, if you are not immunised and you get measles you will never get it again because you become immune to the measles germ.

Vaccines

Some communicable diseases such as TB, polio, diphtheria, whooping cough, tetanus and measles can be very dangerous. Some of these can make you sick for a long time, perhaps all your life. Some diseases can kill people. Because they are so dangerous, scientists and doctors have worked and found ways to make and give vaccines. Vaccines make you immune even if you have never had the disease. They train your body's army of germ-fighting cells. If later you meet the germs that you are immune to, your germ-fighting cells will fight a short and successful battle and you will not get sick.



Most vaccines are given more than once. This is because with most germs it takes more than one lesson for the body to learn how to win against the germ. Boosters are reminder vaccinations. Being made immune by vaccination is called immunisation.

Global eradication programmes

In the past, smallpox killed many people. Because of this, all the countries of the world agreed to vaccinate everyone in the world (who was at risk from smallpox) in order to get rid of the germ. This worked and no one has had smallpox since 1978. The smallpox germ no longer exists in nature. Smallpox is the only disease that has been eradicated. This was done through vaccination.

Polio will be the next disease to go. On Pulse Polio Days two extra doses of polio vaccine, six weeks apart, are given to all children under 5 years. The countries of the world have agreed to do this to get rid of the polio germ.

Mother: So now you know why when you were babies you had all of the vaccinations. But Lobzang, now you need a booster against diphtheria and tetanus, and Sonam, you need a tetanus booster. And you'll need another tetanus booster when you are sixteen years old.

Cells are the tiny living building blocks of all animals and plants. They are so small that you need a microscope to see them. We are made up of a huge number of cells. There are different cells in different parts of the body e.g. lung cells, heart cells, germ fighting cells etc. These cells do different jobs. They all work together to make us live.

How are vaccines made?

Vaccines can be made in many different ways. Some are made from weakened live germs, some from killed germs, some from the poisons that germs make and some from just parts of germs.

Which vaccines are given in Ladakh?

Infants, children and young adults can get free vaccination against tuberculosis (TB), polio, diphtheria, whooping cough, tetanus and measles.

EXERCISES

I Circle communicable diseases prevented through vaccination:

Silicosis measles car accidents tuberculosis (TB) food poisoning polio whooping cough lung cancer tetanus diphtheria

II Match the following:

Vaccination	are diseases caused by germs
Communicable diseases	to rid the world of a disease
Global eradication programmes	is getting a vaccine
Immunisation	is getting a vaccine to become immune as a result of vaccination

III Tick the correct answer:

1. Polio
   a. is a communicable disease
   b. is a disease that has killed and injured Ladakhis
   c. s a disease that can be prevented by vaccination
   d. all of the above
2. On Pulse Polio Days children under five are to be vaccinated against polio.

This means:

a. they will be given an injection of polio vaccine to give them polio

b. they will be given drops of polio vaccine to prevent them from getting polio

c. they will be given a holiday to find out more about polio

IV True or false? If the statement is false, correct it:

If parents teach their children hygiene they need not have their children vaccinated.

Only girls have Immunisation Cards.

Scientists find out how to make vaccines.

Vaccines have saved many lives in the past but are no longer needed.

Only babies receive vaccines.

After we are vaccinated, we no longer need to wash our hands.

V Fill in the blanks with the following words. You may use each word more than once:

Cells immune germ disease

Vaccines make you _ _ _ _ _ _ _ without you having to get a bad _ _ _ _ _ _ _ . They do this by training your_ _ _ _ _ _ _ -fighting_ _ _ _ _ _ _ to fight the _ _ _ _ _ _ _ germs so that you do not get sick.

VI Which of the following diseases has been eradicated?

polio silicosis chickenpox measles cancer

tetanus malaria smallpox diphtheria colds

The above disease was eradicated through:

prayer vaccination clean water improved hygiene

VII Fill in the words from the clues given below:

All words share one letter with the word vaccination:

1. V _ _ _ _ _ _
2. _ _ _ _ _ _ _ _A _ _ _ _
3. _ _ C_
4. _ _ _ _ - _ _ _ _ _ _ _ C _ _ _ _
5. _ I _ _ _ _ _
6. _ _ _ _ N _ _ _ _ _
7. _A _ _ _
8. T _ _ _ _ _ _
9. _ _ _ _ _I _ _ _ _ _ _
10. _ _ O _ _ _ _ _
11. _ _ _ _ _ N _

1. A medicine that protects against a communicable disease.
2. The type of disease that is caused by germs.

3. Now that Sonam is immune he will not get …… from that disease .
4. These can be trained by vaccines to fight disease germs.
5. A sickness.
6. People who work out how to make vaccines.
7. Clean water supplies, good hygiene and vaccines have done this for many lives.
8. A dangerous communicable disease.
9. Being made immune by vaccination.
10. Reminder vaccinations.
11. The name of Sonam's brother, who is due for his diphtheria and tetanus booster.

Complete the words from the chapter to find the name of a dangerous communicable disease. Draw a drop shape and put the word inside.

__ r e v e n t

S__ n a m

c e__ l s

v a c c__ n a t i o n

w h o__ p i n g c o u g h

VOCABULARY

immunisation	རྒྱག་མོ་ཡང་ན་ནད་མི་ཡོང་བྱས་ཀྱི་སྟོན་ས།
clinic	སྨན་ཁང་ཆུང་དུན།
to vaccinate	ནད་མ་ཡོང་བའི་སྟོན་ལ་འདུག་བྱས་ཀྱི་ཐབས།
tetanus	འཇོམ་ལྷག་ཀྱེད།
awful	ཁམས་ལོག
rare	དཀོན་མོ།
limp	ཞ་བོ། ཞ་ཙོ
hunched back	ཚིགས་བྲིག་ཡང་ན་སྐུ་དུ། ཚིགས་སྐུར།
TB (tuberculosis)	བཅོང་ནད།
whooping cough	རྒྱ་ཁོག་ཡང་ན་རླུང་ཁོག
due	བཀང་དགོས་ཤེས་ཅན།
measles	ཆེམ་ཆེམ་ཕྱིན་ཏེ ཅེམ་ཅེམ། (འབྲུང་རུ་མེད་མཁན།)
worst	ཐུ་ཞོག
drop	སྨན་ཐུན། ཐིགས་པ།
chicken pox	ཆེམ་ཆེམ་ཡང་མོ། ཅེམ་ཅེམ། (འབྲུང་རུ་ཡོད་མཁན།)
to catch	རྒྱག་མོ་འབྲུང་བྱས།
communicable disease	འབྲུང་ནད།
to eradicate	རྩ་བ་རས་མེད་མཁན་བྱོ་བྱས།
booster	སྨན་ཐུན་བསྣན་མ།
smallpox	འབྲུམ་ནད།
risk	འཇིགས་པ།
to exist	ཡོད་བྱས།
dose	སྨན་ཐུན།
recommended	བྱི་སྟེ་ཡོད་མཁན། བཤད་ཅེཡོད་མཁན།
to tame	བཀུལ་བྱས།

Notes for the Teacher

Chapter 5: More on Health

Why this chapter?

This chapter discusses some additional health related topics: the *Amchi* Medical System, first aid, and silicosis.

The *Amchi* System has been an integral part of Ladakhi life for centuries.

Simple first aid measures are discussed for some common accidents. First aid knowledge is especially important in Ladakh's remote villages, because medical help may not be immediately available. Silicosis is a lung disease that occurs in parts of Ladakh, so the condition and its prevention are briefly discussed.

Some simple first aid measures have been included. If students practise these in school they may remember them when facing an emergency. Teachers, especially in small schools, should set an example by correctly attending to children's injuries. Rivise the importance of washing any wound or animal bite with soap and water.

It is important to impress upon students that in certain situations they may not know enough to administer first aid. In such cases it is safer to seek help rather than give first aid. With serious internal injuries, incorrect first aid could cause more harm than good.

What else you can do

Invite an *Amchi* to talk to your class.

Ladakhis have a cultural habit of drinking a lot of salt tea and barley wine (*chhang*). Consumption of excessive salt can lead to high blood pressure which puts a person at risk of heart disease and stroke. Encourage children to give up the habit of drinking butter tea as far as possible. All tea contains caffeine, a habit-forming or addictive drug. It is also found in soft drinks, which when taken regularly might lead to an addiction.

Consumption of *chhang* in excess leads to health hazards, apart from social problems and economic losses. As a teacher please try to ensure that children understand these dangers so that they can avoid such harmful habits.

Materials Needed

You will need chart paper, two sticks for a splint, a clean cloth for a sling, another clean cloth for a bandage, soap and water.

Chapter 5
MORE ON HEALTH

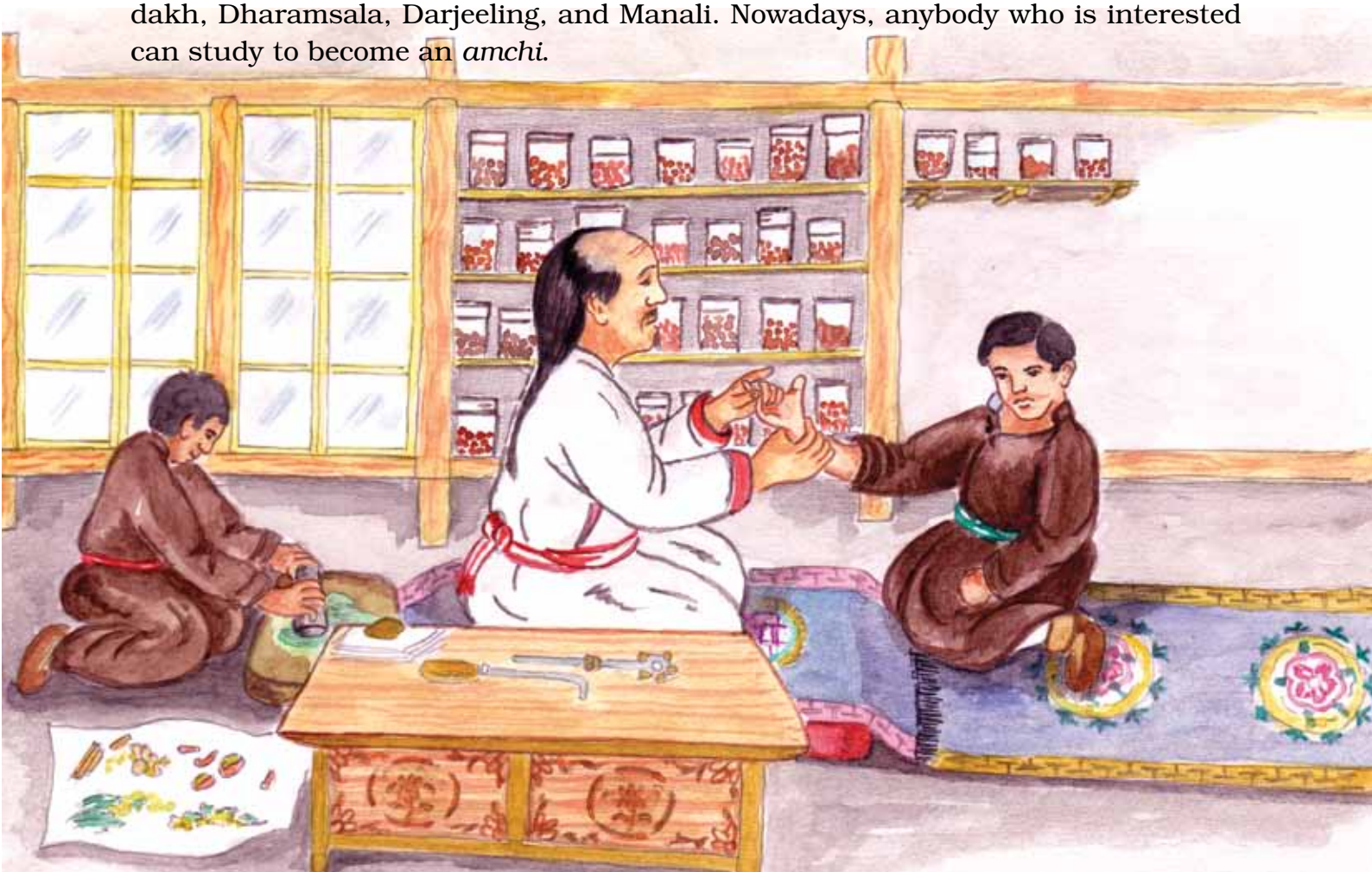
You already know about communicable diseases, immunisation, and a balanced diet. Let's learn some other things about health. In this chapter, we will read about *Amchi* medicine, first aid, and silicosis.

The Amchi Medical System

Have you ever been to an *amchi*? The traditional medicine of Ladakh is known as the *Amchi* medical system or the Tibetan medical system. It is an ancient system of medicine which came to Ladakh from Tibet about 900 years ago *Amchi* medicine uses plants, minerals, and animal parts to treat various illnesses including colds, coughs, fever, diarrhoea, joint pains, and liver, heart and lung problems.

Amchis make medicines from the leaves, stems, roots and flowers of different plants. Some of these plants are found in different areas in Ladakh. Others are collected from outside Ladakh. In Ladakh, the *amchi*s help each other collect plants and other materials. Most *amchis* are also farmers. In exchange for the *amchi*'s services, villagers might help the *amchi* work on his or her field.

In the past, being an *amchi* was mostly a family tradition. An *amchi* would teach his son or daughter whatever he knew. Now there are *amchi* training centres in Ladakh, Dharamsala, Darjeeling, and Manali. Nowadays, anybody who is interested can study to become an *amchi*.



Is there an amchi in your village?

• Talk to him or her and find out how he or she became an amchi.

• Ask the amchi of your village to take your class for a walk around the village and show you medicinal plants. Make a chart of medicinal plants around your village. In your chart, use the headings shown below but make enough space for drawings or leaves to be included.

• Find out from the amchi if there are some simple treatments to help in common illnesses like coughs, colds, and diarrhoea.

Name of the plant	Glue or draw the plant's leaves here	Uses of the plant

First Aid

Master Sheikh was just finishing his breakfast when he heard someone running up to his door.

"Teacher, teacher!" cried Youdon breathlessly, "My brother Sonam has fallen down the grain store and nobody else is at home. Please come and help him!"

Master Sheikh quickly followed Youdon to her house. He went down the ladder to the grain store. He found Sonam in great pain and not able to move his arm.

"I think he has fractured his arm," the teacher told Youdon. Then he took two long sticks and placed them gently on the two sides of Sonam's broken arm. He tied them very carefully with a bandage. He put Sonam's arm in a sling, and gave him medicine to reduce the pain. By now Sonam's mother had come home. Master Sheikh told her, "Now you should take him to the hospital and get an X-ray. There the doctors will put his arm in plaster."

What is First Aid?

Even though we are careful, accidents sometimes happen. A person may break a bone, or get a cut or burn himself or herself. There are things you can do to help the person even before a doctor can see him or her. This is called first aid. If necessary, you should also call a doctor or take the person to a doctor.

Fracture

A fracture means that a bone in the body is broken. The injured part becomes swollen and painful, and needs to be supported.

Be very gentle while helping a person with a fracture.

If possible, do not move the fractured part, because it could cause more injury. Always give it good support before moving it. This is very important.

Support a broken bone by tying two long sticks along the fracture. You can also use cardboard, boards, or even rolled newspaper. The supports should be long enough to keep the broken bone in its normal position, and to keep weight off the broken part.

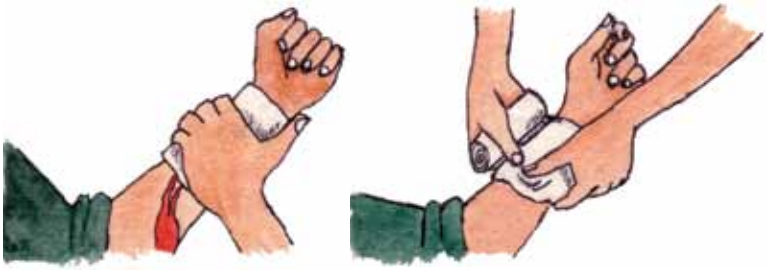
Once the broken part is well supported, take the person to a clinic or hospital to see a doctor. They will need an X-ray. The X-ray will show the doctor if the bone is broken. If it is broken, it will have to be put in plaster until the bone heals.

First Aid for Cuts or Wounds

The first and most important thing to do is to wash the wound with clean water. If the wound or the surrounding area is dirty, or if the wound came from a bite or a dirty object, use soap.

Cover the wound with a clean cloth or bandage. Change the cloth or bandage at least once a day.

Keep the wound dry and clean until it heals. This will help it heal faster. You may wash it with clean water sometimes, but for the rest of the time, keep it clean and dry.



Sometimes a wound gets infected with germs. If a wound starts to get a lot of pus, or the area around becomes red, show it to a doctor. The doctor will treat the wound to get rid of the germs.

First Aid for Burns

1 Cool the burn immediately under cold running water, or put it in a bucket of cold water. Some people believe that it is good to put things like lotion or *zbangma* (leftover barley from making *chhang*) on burns. But clean cold water is the cleanest and best thing for burns.

2 If blisters form, do not break them. They will go down by themselves in a few days. If you break them, germs can get in and cause infection.

3 After washing the burn, cover it with a clean bandage, and follow the advice given under "First Aid for Cuts or Wounds."

A serious burn means a burn over a large area of the body, or any burn that exposes red flesh under the skin. If the burn is serious, wash the area with clean, cold water and take the patient to a doctor immediately.

First Aid if Something Gets into the Eye

1 Try not to rub the eye. Rubbing can make it worse, especially if the hands are not clean.

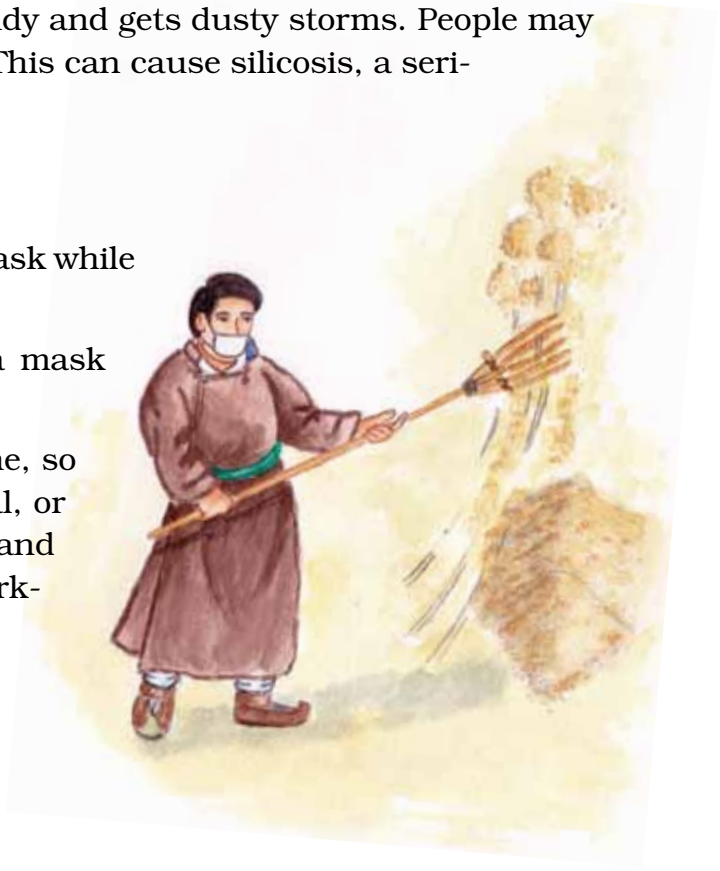
2 Ask the person to look up. Gently pull the lower eyelid down. If you can see the object, use a corner of a clean wet cloth to remove it.

3 If this fails, ask the person to keep their eye open and run clean water into it. This may wash the object out.

4 If this doesn't work, then go to the clinic.

Silicosis

Silicosis is a lung disease mostly seen in villages along the Indus River between Spituk and Rambirpur. This area is very windy and gets dusty storms. People may breathe the fine dust deep into their lungs. This can cause silicosis, a serious lung disease.



You can prevent silicosis by:

- Covering your nose and mouth with a mask while sweeping or working in dusty areas.
- Covering your nose and mouth with a mask whenever there is a dust storm.

The dust that causes silicosis is very fine, so the mask should be made of special material, or of many layers of fine cloth. It may feel hot and uncomfortable to wear such a mask while working, but it can prevent this serious disease.

EXERCISES

I Answer the following questions:

1. What materials are usually used for making amchi medicine?
2. What would you do if someone fell and fractured their leg?
3. What would you do if you burnt your hand?
4. Your brother suddenly cuts his hand while cutting trees. How would you help him? Would you use soap?
5. What would you do if something entered your friend's eye?

II True or false? Correct the false statements:

1. When somebody gets a burn we should immediately put some lotion or sbangma on the burnt area.
2. When something gets into our eyes we should rub them.
3. We should cover our nose and mouth with a mask while working in dusty fields in order to help prevent silicosis.
4. Do not wash a wound with soap and water.

III Fill in the blanks with the words given below:

Amchi medicine silicosis an X-ray a mask dry

1. A doctor looks at _ _ _ _ _ _ _ to find out if a bone is broken.
2. _ _ _ _ _ _ _ came to Ladakh from Tibet about 900 years ago.
3. A wound will heal faster if we keep it clean and _ _ _ _ _ _ _ .
4. People who breathe in fine dust over a long time may get _ _ _ _ _ _ _ .
5. t's good to wear _ _ _ _ _ _ _ when sweeping the floor.

Things to do

Make groups of two or three students. One becomes the patient and one the person who gives first aid. The patient pretends to fall and fracture an arm. Practice supporting the arm with sticks, a bandage and a sling. Then reverse the roles between the two students.

In the same way the students can practice first aid for burns and cuts.

VOCABULARY

to treat	སྨན་དབྱད་བྱོ་བྱས།
silicosis	ཐལ་ཚུབ་རས་འབྱུང་བའི་ཚྲོ་རད།
breathlessly	ཉེར་རིན་ཞིག ཏལ་ལིན་ཞིག
ladder	སྐས་ཀ
to fracture	དུས་པ་ཆག་བྱས།
bandage	རྨ་དཀྲིས། རྨ་ཁ་དཀྲི་བྱས།
swollen	སྐྱང་ས་མཁན། ཐྲོ་ཤས།
to heal	རྒྱལ་བྱས།
pus	རྣག
lotion	བསྐུ་ཆུ།
flesh	ཤ།
blister	ཆུ་ཕྲང་།
storm	རླུང་དྲག
mask	ཁ་རས། ཁ་སྦྱིས།
layer	བང་རིམ། ཁྲིམ་བང་།
shovel	ཁྲེམ།

Notes for the Teacher

Chapter 6: Preserving food

Why this chapter?

This chapter explains the concept of micro-organisms like bacteria and moulds and how they make stored food rot. As preserving food for winter is important here in Ladakh, children should understand some common methods of preserving food. Food preservation is one of the many important ways in which science gives us practical knowledge for improving our daily life.

The teacher should link this with the previous chapters on health issues. Eating rotten or bacteria-ridden food can cause serious illness, and students should understand that low temperatures alone may not necessarily prevent bacteria or mould from growing on food if not properly preserved.

Extra information

Ask students about the methods they have seen used at home to preserve foods. Talk about how each method prevents the growth of bacteria and moulds. Some particular food items that could be brought up in discussion are:

Vegetables and fruits are preserved for the winter by drying them in the sun during the summer season. Fruits can also be preserved as jams, pickles and bottled juices.

Churpe or dried cheese is made by drying it in the sun until it becomes hard.

Meat is preserved in some regions using one of two methods. In the winter, the meat is simply allowed to freeze for storage. Meat is also sprinkled with salt and flour and left to dry, and then stored after it is fully dry.

We preserve potatoes and carrots by storing them under ground in pits, covered with soil to prevent freezing. These root vegetables actually remain alive in these conditions.

What else you can do

If you have access to a microscope, try looking at many different substances. Stand it in a stable position, explain how delicate it is, and give each child a chance to look.

If you teach in a fruit producing area, try making jam when apricots are ripe.

Do grow some mould on a piece of bread for children to observe. Prepare at least two days in advance by putting it in an airtight plastic bag with a few drops of water. In cold conditions it may take more than two days for visible mould to grow, so keep it in a warm place. Of course white bread from the market is not required, any local bread will work as well.

Materials Needed

To observe mould, you will need:

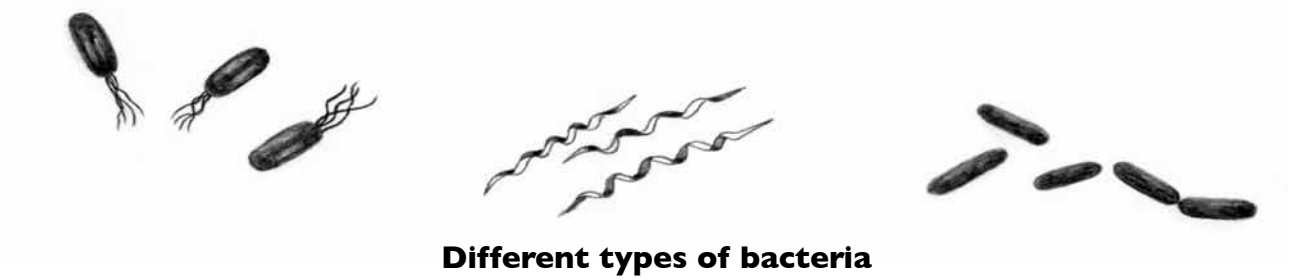
- a piece of bread
- a plastic bag
- a hand lens (magnifying glass)
- a microscope (optional but very useful)

To make jam you will need:

- Some clean jars (wide-mouth bottles) and lids, without dents or cracks
- two pots and a stove
- large spoon
- clean cloth
- approximately equal amounts of fruit and sugar.

Chapter 6
PRESERVING FOOD

Have you ever seen living things that look like these?



Different types of bacteria

You may not have. That is because these are very tiny—so tiny that you cannot see them with your naked eyes. You need a microscope to see them. A microscope makes very small things appear big.

Bacteria

If you put a drop of river or stream water under a microscope, you can see small living things moving in the water. Some of these are bacteria. Bacteria can be found almost everywhere. They live in soil, air, water, on our skin and inside our digestive system.

Many types of bacteria help us. For example, one type of bacteria found in milk can make curd.

Other kinds of bacteria, which live in the soil, decompose dead plants and animals and make them a part of the soil. As bacteria do not feed on things like steel, aluminium and plastic, these break down very slowly.

Some kinds of bacteria can be harmful to us and cause disease in humans and animals. These harmful bacteria are called germs.

Microscope

Other types of bacteria cause food to rot. The pictures below show a tomato that is going rotten. Bacteria are living in the brown area. The brown area gets bigger and bigger until the whole tomato is rotten. A small number of bacteria multiply and become crores. Bacteria can cause all types of stored vegetables and fruits to rot. It is important to prevent this from happening.

A kind of bacteria that cause sore throat

Activity: Take a piece of bread. Put ten drops of water on it and leave it in a closed box or plastic bag in a warm place for a few days. Open it and then note what you see. If you have a hand lens, you can use it to see more clearly. What do you observe?

.....

.....

.....

hand lens
(magnifying glass)

Mould

The tiny threads growing on the bread in this picture are mould, which is another type of tiny living thing, a fungus. Mould also causes stored food to rot, It can grow on any kind of food that is not dry. Mould can even grow on leather shoes left in a damp place.

If you leave the bread for a few more days, you will see that the threads become more in number, and grow small buds that soon turn black.

How to make food last longer

Moulds and bacteria cannot make their own food. They have to live on other living or dead animals and plants. They take food from them and give out gases and wastes. So when they grow on our food, the food looks rotten and smells bad.

Bacteria and mould grow best in warm, moist conditions. To preserve food, we have to make conditions that bacteria and mould cannot grow in, *e.g.* too dry or too cold.

a) Drying food

In Ladakh, drying is the most common method of preserving food. This is because the air is very dry here. Some foods that are commonly dried in Ladakh are apricots, leafy vegetables, and cheese. If this food is stored in dry conditions, bacteria and mould cannot grow. Then the food will not go bad.

Name four other Ladakhi foods that you have seen dried.

.....

.....

Many Ladakhi families make special hard biscuits, called puli or tuktuk, for travelling. Why is this better than normal bread for travelling?

.....

.....

Some of the food we buy is preserved by drying, such as readymade noodles or powdered milk. Can you think of any other dried food that we buy from shops?

.....

.....

b) Storing food in cold conditions

In cold conditions, organisms grow very slowly. In a cool storeroom or a refrigerator under 3°C, milk, leftover food, and curd will stay fresh for several days, but in a warm place, they will go bad quickly. In frozen conditions (under 0°C), most bacteria and mould cannot grow at all. This is why we can store meat frozen and use it all winter, but in summer, without refrigeration meat will go bad in a day or two.

c) Other methods of preserving food

Fruit jam does not go bad in storage even though it is not dry or cold. This is because it is kept in a clean airtight jar so that no mould or bacteria can enter. It is easy to make jam:

1) First cook fresh fruit, for example apricots, or sea-buckthorn berries with sugar, until it becomes like jam.

2) While the jam is boiling hot, put it into very clean glass jars.

3) Wipe the edges clean and put on a clean, airtight lid.

4) Then put the whole jar into boiling water for 10 minutes.

The jar and lid that you use must be in perfect condition with no dents or chips, so that it becomes perfectly airtight. After boiling, do not try to tighten the lids or open them even for one second, because some mould from the air may get in. This way we can store the jam for a year and it will not go bad. As soon as we open it though, some mould may get in and start to grow, just as it can on any food.

Pickling is another method. To make pickles that will last a long time, the vegetables are partly dried. Then salt, spices and oil are added. Bacteria and mould cannot grow with so little moisture and so much salt, spices and oil, so the pickles last a long time.

You can see that as long as we prevent bacteria and mould from growing, there are many ways to preserve food so that we can use it later. In the winter, we can have fruit and vegetables for a balanced diet if we have preserved them properly.

EXERCISES

I Answer the following questions:

1. Why does dried food last longer?
2. What are bacteria? Where do you find them?
3. Are all bacteria harmful? What is one way that bacteria are helpful to us?
4. Where have you seen mould? What does it look like?
5. What methods does your family use to preserve food?

II Fill in the blanks with the right words:

1. Bacteria can be seen with a _ _ _ _ _ _ _ _ _.
   (telescope; microscope; stethoscope)
2. Bacteria can be found in _ _ _ _ _ _ _ _ _.
   (soil; water; air; inside living things; almost everywhere).
3. Bacteria feed on things like _ _ _ _ _ _ _ _ _.
   (steel; aluminium; plastic; dead plants and animals)
4. Mould _ _ _ _ _ _ _ _ _.
   (makes its own food; takes food from dead plants and animals)
5. In very cold conditions, food lasts longer because _ _ _ _ _ _ _.
   (mould and bacteria grow quickly; mould and bacteria grow very slowly)
6. Fruit can be preserved by _ _ _ _ _ _ _ _ _.
   (heating; making jam; both drying and making jam)

III True or false? If false, correct the sentences:

1. When vegetables are dried, they rot quickly.
2. In cold conditions, mould and bacteria grow very fast.
3. Mould can grow on leather objects in a moist place.
4. Milk and curd can stay fresh for a few days in a cold refrigerator.

VOCABULARY

tiny	ཆུང་ངུ།
to appear	མཐོང་བྱས།
drop	ཐིགས་པ།
curd	ཞོ།
to decompose	རུལ་བཅུག་བྱས།
to rot	རུལ་བྱས།
leather	ཀོ་བ། པགས་པ།
damp / moist	བད་ཅན། རྩུབ་ཅན།
bud	རིལ་བུ་ཆུང་ངུན་པ་ཏུམ་རོགས།
refrigerator	ཁང་རྩི་གྲང་མོའི་འབོར་བའི་མི་ཤིན།
leftover	ལྷག་མ།
jar	ཁ་ཆེན་མོ་ཅན་གྱི་བོ་ཅོལ།
frozen	གངས་ལ་ཆ་མཁན། ཁྲགས་ལ་ཆ་མཁན།
to wipe	ཕི་བྱས། ཤྭགས་མོ་བྱེ་བྱས།
edge	ཁ་ཟུར། མཐའ་མ།
airtight	དམ་པོ། དམ་ཤན།
to tighten	མང་བ་དམ་པོ་བྱེ་བྱས།
pickle	ཇན་ཅར།
dent	རྐོབས་མཁན། ཁོམ་མཁན། ཡོམ་མཁན།
chip	ཪ་པིག་ཆག་མཁན།
bacteria	མིག་ནས་མི་འཇིན་མཁན་གྱི་འབྲུ་ཆུང་ངུན་རིགས་ཕྱིག
mould	ཏུམ་བོར། བ་མོ་ལང་མ་མཁན།
organism	དབུགས་ལྡན། སྲོག་ཆགས། སྲོག་ལྡན།

Notes for the Teacher

Chapter 7: Life Cycles of Animals

Why this chapter?

This chapter includes the life cycles of species that are found in Ladakh and covers examples from mammals, birds, reptiles, and insects. The characteristics of these groups were covered in class 4 but the teacher should lead a short revision at the beginning of the lesson to make sure that the children remember these.

Life cycles of representative examples are included to show the differences in stages from birth to adulthood. The teacher might want to consider having the students enact the chapter. It is dramatically written, and active involvement in the roles of the different species may increase the level of understanding.

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Points for Discussion/ Clarification

The life cycles of some species found in Ladakh are given. If you know of other species, in your area, you may use them as additional examples.

What else you can do

Take your class on a nature walk to look for different birds, mammals, reptiles, and insects that are breeding. Excursions are very good teaching tools and are well worth the effort put into their preparation. Spring is the best season to plan such an excursion.

Plan a walk that includes nesting birds and insect localities, perhaps near flowering plants. Point out the preparations that the adult animals make during the entire reproductive process. Encourage students to observe how all animals choose a safe place to reproduce at a time when food is in plenty. The fertilization process has not been included here. However, you can mention that in most cases a female and male are required for the start of a life.

In early spring, Ladakhi streams are full of insects and worms in the various stages of life. Take several glass or plastic jars and several tea strainers. Tell the children not to harm the creatures nor to keep them out of water for more than a second, but to catch any creatures gently and keep them in water. At the end of the hour, release all the creatures gently back in to the stream.

You will find the largest number of creatures in streams in the early spring, even when there is still a bit of ice in the shady corners of the stream. At this time many insects are in the nymph stage, living in water. By summer many have changed in to adults, grown wings, and left the water.

Materials Needed

For the activity to observe stages of life of a fly you will need:

- fresh cow dung
- a glass jar
- a thin cloth to cover the mouth of the jar so that air can circulate freely but insects cannot get out.

For the stream excursion:

- several tea strainers
- several clear plastic or glass jars

Chapter 7

LIFE CYCLES OF ANIMALS

It was a warm summer day in the high mountains in Hemis National Park. A magpie, a cabbage butterfly, and a goat kid were quarrelling about how they came into the world.

"Pika will tell you that I was not hatched from an egg," cried the goat kid.

"Yes, you were! Every animal is hatched from an egg, just like I was," yelled the magpie.

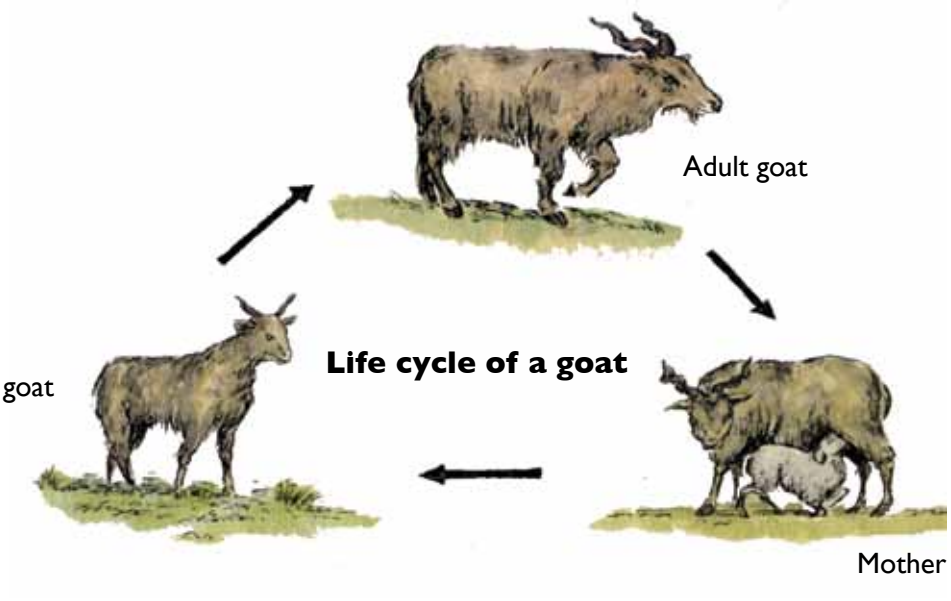
"No! No! Both of you are wrong. You must have changed form many times. My mother told me that I changed three times," said the cabbage butterfly.

The three decided to go to the wise pika, who knew many things. The magpie, butterfly, and the kid soon found the pika, who was sitting on a large rock.

The pika smiled as he listened to them argue about how animals are born.

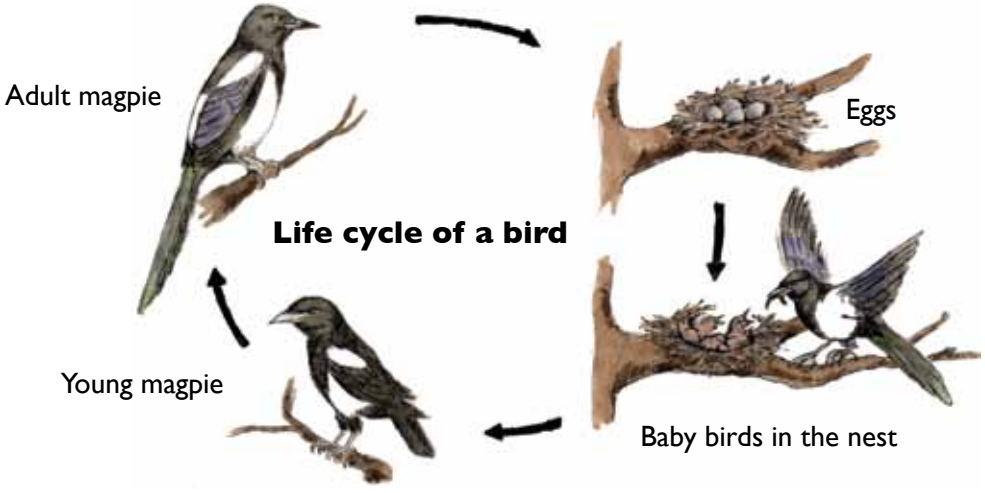
When they finished he said, "Our large earth has crores of different kinds of animals on it. They differ in where they live, how they move, what they eat, and even how they came into the world. Come, sit around me, and I will tell you how each one of you came to be and how you grew. Let me start with you, goat kid, as you are the youngest.

"You started life inside your mother's body. When you were fully developed you were born. At birth you already looked like your parents. You even had hair on your body. Of course, you were very small, and had to feed on your mother's milk to grow big. Animals like you, and cats, dogs, cows, humans, wolves, leopards, and even us pikas are born this way. We are all mammals."

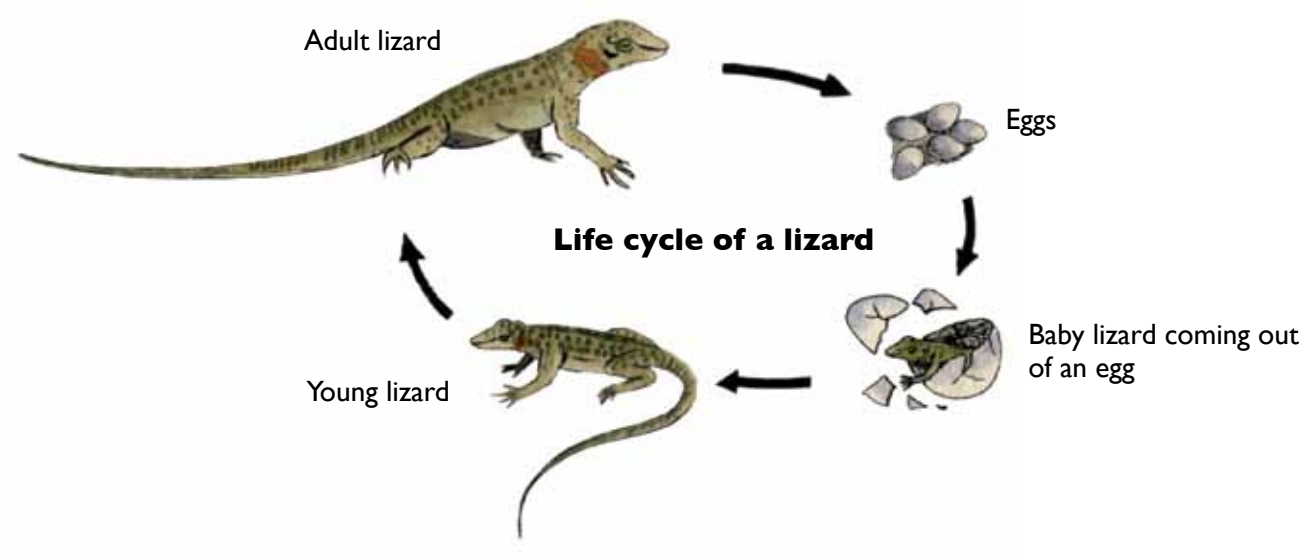


Then the pika said, "Your turn next, magpie! You are a bird. You were hatched from an egg. Your parents made a large nest of twigs, grass, and mud. Then your mother laid some eggs and your parents took turns sitting on them to keep them warm. Soon the eggs hatched and you came out of one."

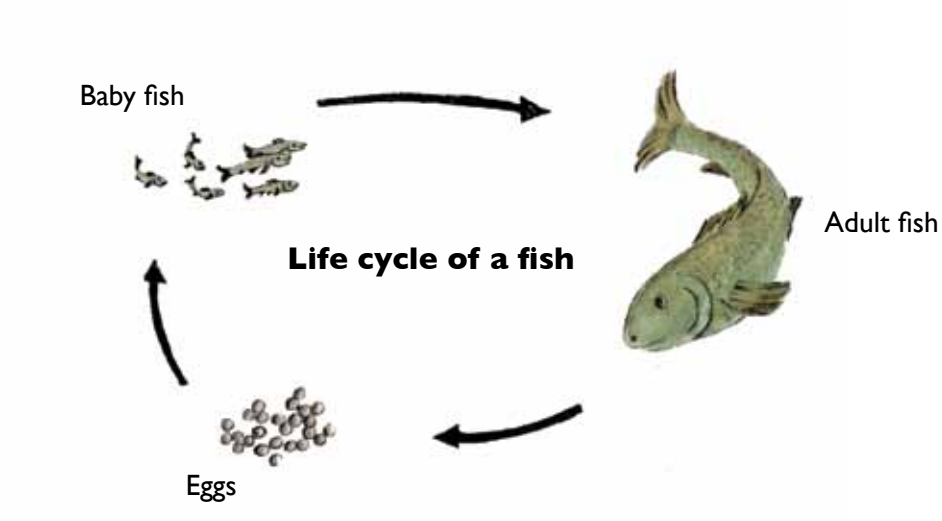
"In the beginning you had no feathers on your body and you could not see. Your parents had to feed and look after you. Later your eyes opened and you grew feathers. But your parents still had to look after you until you were ready to leave the nest."



"Did you know," continued the pika, "lizards and snakes also lay eggs? Their eggs are kept warm by the sun."



"Did you know that most kinds of fish are also hatched from eggs?" added the pika.



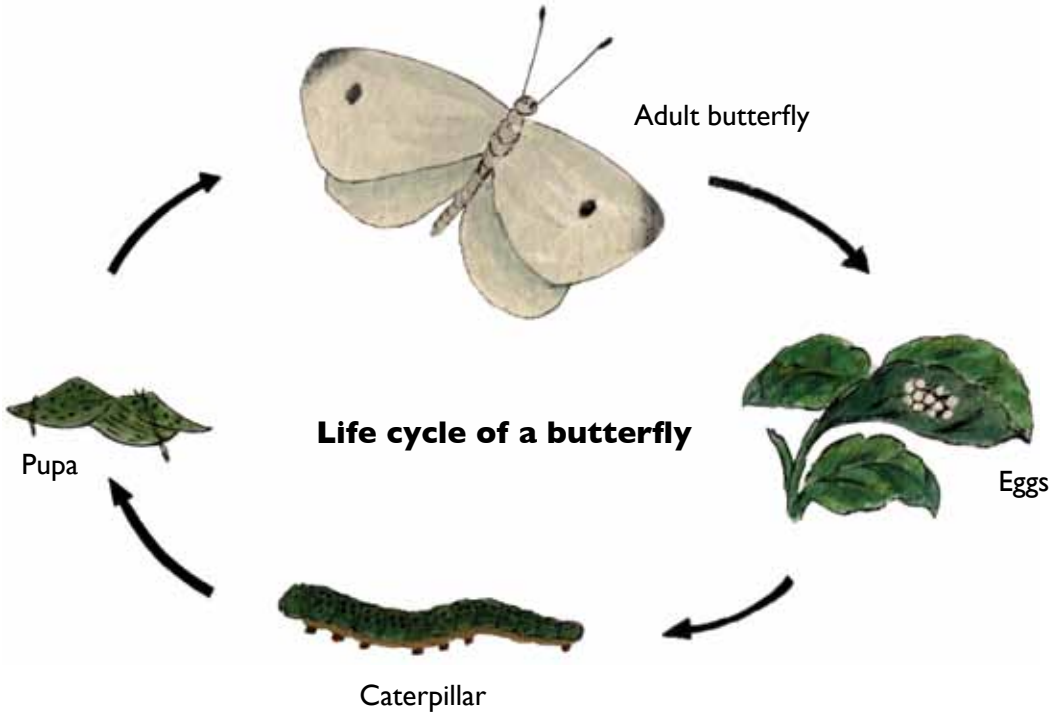
"Oh! How interesting! We didn't know that," said the magpie and the kid together.

The cabbage butterfly was very quiet. "But what about me, pika?" she asked.

"You, cabbage butterfly, are an insect. The life cycle of insects is completely different. But different insects have different life cycles. You, cabbage butterfly, changed form three times before you became a butterfly. Your mother was a butterfly who laid eggs on a cabbage leaf. When you hatched from your egg, you did not look like your parents at all. You were a larva. A larva of a butterfly is called a caterpillar."

"You were always hungry and kept moving about looking for fresh cabbage leaves to eat. You grew bigger and bigger. After some time, you attached yourself to a leaf and stopped moving. Your body developed a new covering. At this stage, you were called a pupa. Inside the pupa, your body changed and became a butterfly."

"When you were fully developed, your pupa covering split and you came out. You had to wait a little while for your wings to dry before you could fly!"



The life cycle of a fly

1. Collect some fresh cow dung. Leave it for some time in a place where you are sure flies will come to sit on it.

2. Then, put the dung in a glass jar. Tie some cloth over the mouth of the jar so that air can get in but insects cannot get out.

3. Keep it for several days in a warm place, but not in direct sunlight. Add a few drops of water when neeeded so that the dung does not dry out completely.

4. Every day, observe what has happened. Gently break open the dung to see the changes inside. Can you see eggs, larva, pupa and adult flies? Note down the day each stage begins.

5. Look at the different stages of life of the fly carefully and draw their pictures in the diagram below.

Eggs

Adult fly

Larva

Pupa

EXERCISES

I Answer the following questions:

1. Name three types of animal that hatch from eggs.
2. Name three animals that feed on their mother's milk when young.
3. Are you a mammal? Give reasons why you think so.
4. In simple words and with drawings, describe the life cycle of a bird.
5. How are lizard eggs kept warm? How are bird eggs kept warm?
6. Arrange the butterfly's life cycle stages in the right order.

   Pupa Egg Butterfly Caterpillar

II True or False? If the sentence is false, rewrite it to make it true:

1. A lizard comes from an egg.
2. The butterfly changes into a caterpillar.
3. All animals come from eggs.
4. Fish come out of their mothers' bodies as baby fish.
5. Most mammals are born with hair on their bodies.

III State whether the following animals are birds, mammals or insects:

1. Pika
2. Magpie
3. Eagle
4. Cow
5. Butterfly

Things to do

In your notebook draw a picture of one mammal, one bird and one insect that you see around your house. Draw its young one too. Colour it. If possible, each student should draw different animals.

VOCABULARY

to argue / to quarrel	ཁྲབ་ཁྲབ་ཆ་བྱས། འཛིང་མོ་གཏང་བྱས།
to attach	འབྲེལ་བྱས།
beak	ཁ་སྐྱུ།
kid	རི་གུ
pika	ཇ་ར། ཁྱི་ཁྲེལ།
to hatch	ཁྲུལ་ནས་འཐིང་བྱས།
magpie	བྱ་ཁྱི་བོ། ཅ་སྡང་བྱ་ཀིད། ཁ་སྦག
form	དབྱིབས། བཟོ་ལྟ།
wise	བསམ་བ་ཅན།
turn	རེས།
twig	ལྟུག་སྡིག
feather	བྱ་སྤུ། གཤོག་ལ།
to look after	སྐྱོང་བྱས། བསྲུལ་སྐྱོང་གཏང་བྱས།
insect	ཤད་ལག་དྲུག་ཅན་ཀྱི་འབྲུ་ཙིག
Hemis National Park	ཅི་ལིང་སུམ་མདའ་ན་ས་བཏང་སྟེ་ཤེས་ཚུགས་པ་ཡོད་མཁན་ཀྱི་རི་སྐྱངས་དང་ཡུལ་ལྗོངས་ཀུན། གཀུན་ཀྱི་ནང་ལ་རིའི་སེམས་ཅན་ཀྱི་སྡུང་སྐྱོབ་བྱོས་ཏེ་འཚོར་ར་ཆོག

Notes for the Teacher
Chapter 8: Life Cycles of Plants

Why this chapter?

This chapter familiarises students with the parts of a seed, and different methods of propagation. Students should know that all living things reproduce (i.e. produce young like themselves), and the plants, as living organisms, are no exception. The chapter explains how the seed of a plant grows into a new plant under the right conditions. Emphasis has also been given to the different artificial methods of propagation of varieties of plants grown in Ladakh, such as cutting and grafting.

The chapter is very specific in its focus on the development of the seed into a plant and the conditions that facilitate such development. It is important that children understand the different stages of the life cycle so that they have a strong base to build on when they learn about fertilization and seed dissemination in later classes.

What else you can do

Start the lesson by having children bring one or two seeds of as many different kinds as they can find. Have children stick the seeds on chart paper and label them.

Methods of propagating plants vary from region to region. Discuss the methods that are used in your region.

Demonstrate the method of grafting to students. This would be more useful than just learning the theory. Invite someone who knows the technique to show it to the students if you do not have exprience.

In spring, plant a tree from a cutting in your school compound. Make a plan for students to take turns watering the trees.

Materials Needed

You will need

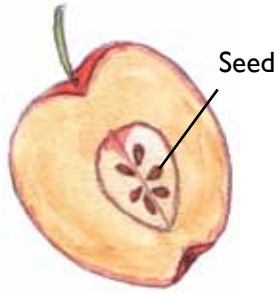
- different seeds and grains
- 3 glasses
- water
- 15 dry beans (e.g. *rajma dal* or Ladakhi peas)
- a very clean piece of cloth
- chart paper.

Chapter 8

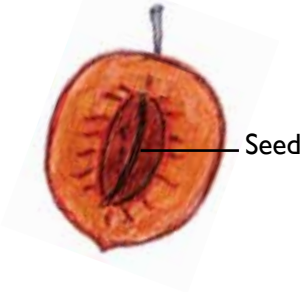
LIFE CYCLES OF PLANTS

All plants and animals are living things. They produce young like themselves. This is called reproduction.

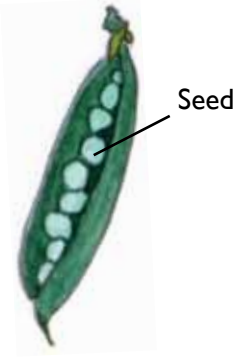
Most flowering plants that we see around us reproduce through seeds. Even a big walnut tree starts from a small seed. Where are seeds found? You can see seeds if you take a fruit and cut it into two.



Apple



Apricot



Pea

Bring to class as many different seeds and grains as you can get, one of each.

Name the plants they come from.

How is one seed different from the others? (shape, size, colour, markings, etc.)

Stick the grains and seeds on chart paper and label them.

Conditions seeds need to grow

Inside each fruit you see seeds. However not every seed will grow into a plant. Some may be damaged and some eaten by animals. Others may not find conditions good enough to grow.

So, what conditions do seeds need to grow?

Take three glasses and fifteen dry beans. In the first glass put five dry beans or peas and fill the glass with water. In the second glass put some moist clean cloth with five beans. In the third glass just put five dry beans and no water. Keep them in a warm place for several days. Add a few drops of water to the cloth each day so that the seeds stay moist. Which one do you think will grow the best?

Put some extra seeds in the glass of water so that each day you can take one out and open it.

Keep the glasses in a warm place where the sun can reach them for one week. Make sure that the cloth does not dry out. After a few days write down what you see. You are now doing what all scientists do — you are looking carefully and thinking about what changes you see.

Seeds in glass 1: Have grown _____cm.

Seeds in glass 2: Have grown ____cm.

Seeds in glass 3 : Have grown ____cm.

What did you discover from your experiment? How did the seeds change? Can you explain why some seeds grew more than others and some seeds did not grow at all?

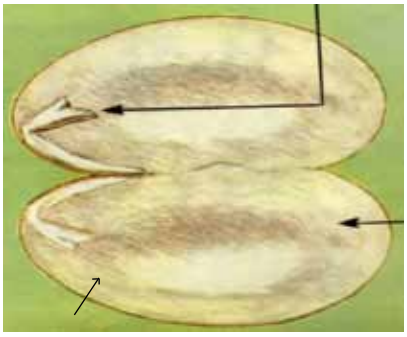
All the seeds got sunlight. Seeds in glass 1 got water but did not get air. Did the seeds grow at all? Seeds in glass 3 got air but not water. Seeds in glass 2 got both air and water. Which seeds grew the most, and which the least? You have made some very important scientific discoveries.

Congratulations! After a few more days the growing seeds will also need soil to continue growing.

Parts of a seed

Isn't it wonderful to see plants growing from seeds? Have you ever wondered what is inside a seed? It is very easy to see the parts of a seed.

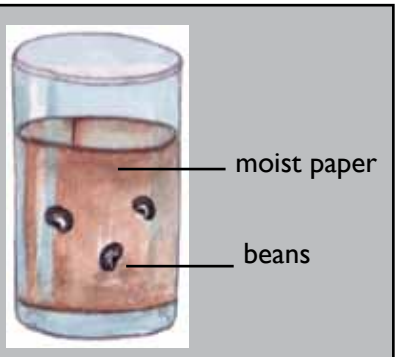
Take a few dried peas or beans that have been in water for one or two days. They have become soft and swollen. Slowly open the seed from the centre. What do you see?



The seed cover protects the seed from harm. The food store gives food to the baby plant till it can make its own food. The baby plant grows into an adult plant if it gets air, water, soil and sunlight.

Take a glass. Put a strip of paper curled inside the glass so that it fits tightly against the glass as shown in the diagram.

You have already soaked some seeds so that they are swollen. Put some of them between the paper and the glass. Keep the paper wet at all times. Fill the middle of the glass with paper or cloth if necessary, to keep it wet. Place this glass in a warm place for a few days.



Draw what happens every two days. Write one or two sentences about each stage in your note book.

Day 2: a) _____ b) _____

Day 4: a) _____ b) _____

Day 6: a) _____ b) _____

Day 8: a) _____ b) _____

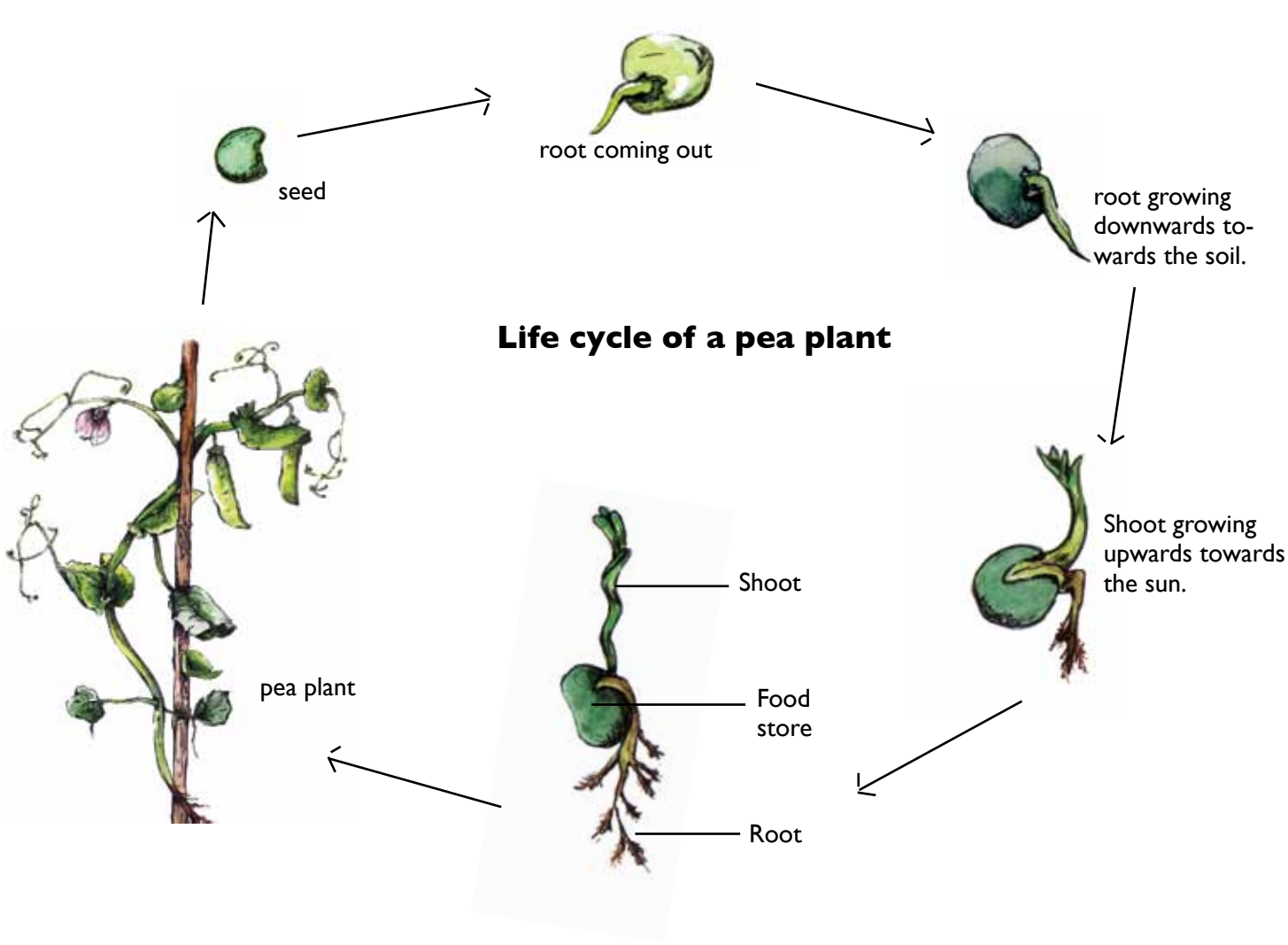
Day 10: a) _____ b) _____

You will see that in a warm wet place the baby plant in the seed begins to grow. It has a small root and a small shoot which will grow into stem, leaves and other above-ground parts of the plant.

Which part grows towards the sun?

Which part grows towards the ground?

After a few days, the root and stem grow longer. The leaves become bigger. Slowly, the food store will become smaller as it gives food to the growing plant. After some days, the food store will be used up. However, by this time the roots and leaves of the young plant have become bigger. The roots will grow down into the soil and take in water and minerals. The leaves will start to make food for the plant.



Life cycle of a pea plant

Now, let's take the example of a tomato plant. We plant the seeds in spring. By summer, the plants are full-grown and produce flowers. These flowers become fruits, which have seeds inside. The fruits are called tomatoes and we can eat them, and save some of the seeds to plant next year.

Other ways of getting new plants

Cuttings

Besides seeds, many plants can reproduce through other parts, like their roots, stems or even their leaves.

Every year people start new grape plants, willows and poplars using cut pieces of stem called cuttings. In early spring, before the leaves come out, we cut the branches of willows and poplars. The branches are actually alive, although they don't look alive. For best results, plant the cuttings on the same day they are cut. If that is not possible, keep the bottom ends in water until you plant them. If the branches dry out, some of them may die.

Then we plant the cut branches in the ground. After planting, we keep the soil moist and protect them from animals. After some time, each cutting produces new roots and leaves, and grows into a new tree.

cutting branches

cuttings in moist soil

sprouted cuttings

Grafting

When we plant a fruit seed, it grows into a tree, but the fruit of the new tree may not be good. For example, Ladakh has a very sweet variety of apricots with white seeds. If we plant one of these white seeds, it will grow into an apricot tree. But in most cases, this tree's fruit will be sour and have brown seeds.

People use a method called grafting to make sure that new trees give good fruit. At a certain time of year, a farmer takes pieces of stem with living buds from a

sweet-apricot tree and carefully grafts them onto a sour-apricot tree. The branches that grow from the sweet-apricot buds will produce the same type of sweet fruit as the tree the buds came from.

Ladakhi fruit growers also graft apple trees. All over the world, grafting is done on different types of fruit trees and flowering plants to get good varieties of fruits and flowers.

Here is one style of grafting that can be done in midsummer.

1. Carefully cut out a bud from a sweet apricot tree

2. Make a cut above it and remove it from the stick.

3. Cut a T shape through bark of a young sour apricot tree

4. Separate bark from wood carefully

5. and 6. Put the sweet apricot bud inside the bark of the sour apricot tree and tie it.

After 2 or 3 weeks, remove the covering so the stick can grow thicker. Next year, after new leaves come out of the grafted bud, cut off the old sour apricot branch above it. When the new branch produces fruit, they will be sweet.

Is grafting done in your village? If so, watch it and see how it is done. The exact way of grafting may be different but does it make a sweet apricot bud grow on a sour apricot tree? Make a chart of the different steps.

EXERCISES

I Answer the following questions:

1. What is reproduction?
2. How do flowering plants reproduce? Name any five plants that reproduce this way.
3. What conditions are necessary for a seed to grow? Describe an experiment to show these conditions.
4. Draw and label a diagram showing the different parts of a seed. What is the function of each part?
5. Name two kinds of tree that are grown through cuttings.
6. What is grafting? On which kinds of trees and plants is grafting ususally done?

II Find the odd one out:

1. Barley, Willow, Wheat, Peas.
2. Willow, Poplar, Mulberry, Cabbage.
3. Willow, Apple, Apricot, Walnut

III Different methods of growing new plants are given below. For each plant, put a tick in the correct column to show how people grow new ones. Add three other plants that you know:

Cuttings	Seeds	Cuttings and seeds	
Apricot			
Willow			
Walnut			
Poplar			
Cabbage			
Apple			
Wheat			

Things to do

Draw and label the life cycle of a plant that you have seen.

OR

Make a colourful chart for your class showing how cuttings are grown in your village.

VOCABULARY

to produce	སྐྱེ་བཙུག་བྱས།
to label	མིང་སྦྱར་བྱས།
damaged	དོད་ཤེད།
wonderful	སྐྱིད་པོ། ཤ་ལས་ཕན།
to swell	སྤོས་ཤས། སྤྲོ་ཤས།
curled	གཏུ་མཁན། གཏུད་ལ་ཆ་མཁན།
to soak	སྦད་བྱས།
shoot	ལྗང་པ་ཅོག་སེ། སོན་རྩོལ་མཁན་ཡང་ན་སྡུད། ཁྲི་གུ་གཏད་བྱས།
mineral	ཇ་སྐ།
cuttings	བཙུག་བྱས་ཀྱི་ལག་ཚུགས།
grafting	ལེ་བན་གཏད་བྱས།
grape	ཁྲུན།
sour	སྐྱུར་མོ།
leaf bud	ཁྲི་གུ་ཡང་ན་ལོ་མ་འབིད་བྱས་ཀྱི་ཚོགས།
bark	ལྗང་མའི་པགས་པ།
stem	དེམ། སྡོང་བོ།

Notes for the Teacher

Chapter 9: The Web of Life

Why this chapter?

This chapter builds on the 'Food Chain' chapter in class 4. It shows the complex links between various food chains, and the way they are delicately balanced. Through a story, the chapter highlights how this balance can be disturbed by human interference. It helps students understand the ecological system of Ladakh and how important it is to preserve it well. The chapter also includes brief information on the need for protected areas.

The food web discussed here is based on some species found within the Hemis National Park, a protected area. It is strongly recommended that students are encouraged to think of different food webs, especially in other ecosystems (example, a lake).

Points for Discussion

In the section on protected areas, discuss with your class how different kinds of human activities could affect the environment and what your students could do to lessen the impact.

Answers to some exercises in the text

Web of Life: In the exercise based on the picture of a valley given at the end of the lesson, the mistakes are 1) the corral wall is too low 2) the corral gate is broken and 3) houses have been built against mountains, so wild animals can jump in.

Instructions for Web of Life game

There should be at least 15 students for this activity. You could combine two classes for this.

Make a set of cards, each with a name of any mammal, bird, insect, or plant of Ladakh. There should also be cards for 'Sun' 'Soil' 'Air' and 'Water'. Make sure there are as many cards as there are students. Ask the students to sit in a circle. Give each student one card. Ask the student to pin each card on his/her shirt so that all the others can see what is written on it.

Take a ball of string or wool and give it to the 'Sun'. Let this student wind the end of the string around her finger. She then looks around for a relationship with one of the cards. For example, she may choose 'Grass' as she is the source of energy for it. She tells the rest of the group how 'Sun' and 'Grass' are related. She then throws the ball of string to 'Grass' who winds the string once around his finger. The string must be held tight between the 'Sun' and the 'Grass'.

Now it is the turn of the 'Grass'. He looks around for some part of nature that is directly connected to him and passes the string to that element after explaining the relationship. In this way, the ball of string is passed around as each child winds the string around his/her finger. Towards the end, some of the elements may get the string more than once to include all the students. This creates a web like effect. Ask the students to look at this web and discuss how the relationships in nature are like a complex web.

Now ask the students to raise the web chest high. Let them hold it tightly so that if the web is pressed down it does not touch the ground.

Now ask the students what would happen if some elements were removed, (excluding air, water, sun and soil, without which the web of life would be destroyed completely). For example, you could say that all the 'Grass' disappeared or that all the 'Lizards' were killed. Let the students who represent these affected elements ('Grass', 'Lizard' etc), drop the string. What happens to the web?. As elements are dropped, the web will collapse.

Discuss with students how inter-relationships exist in nature and how they are important. Also discuss what would happen if the Sun or any of the other three major elements of nature were disturbed.

Suggestions for the cards: Sun, Soil, Water, Air, Tree, Fruit, Eagle, Butterfly, Fish, Dragonfly, Lizard, Leaf, Ant, Human Being, Grass, Root, Seed, Spider, Snake, Fox, Wolf, Urial, Marmot, Chukar, Barley, Magpie, Goat, Flower.

Materials Needed

For the activity you will need

- 20 or so name cards
- a ball of wool or string
- safety pins.

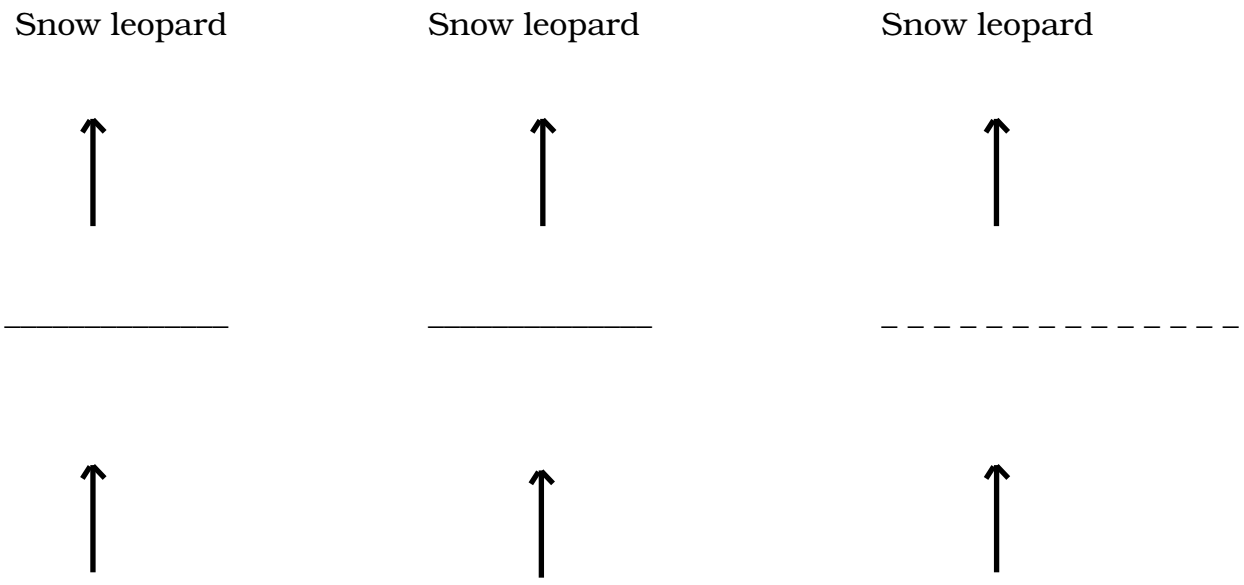
Chapter 9

THE WEB OF LIFE

Come with me to Hemis National Park. It is a large area in the high mountains in central Ladakh, near Leh. The mountains are very steep and rocky. They may be difficult for you and me to climb. However, many animals like the snow leopard, fox, wolf, blue sheep, ibex, argali, marmot, vulture, and the golden eagle live there. They are dependent on each other and on plants for food. Let's see how!

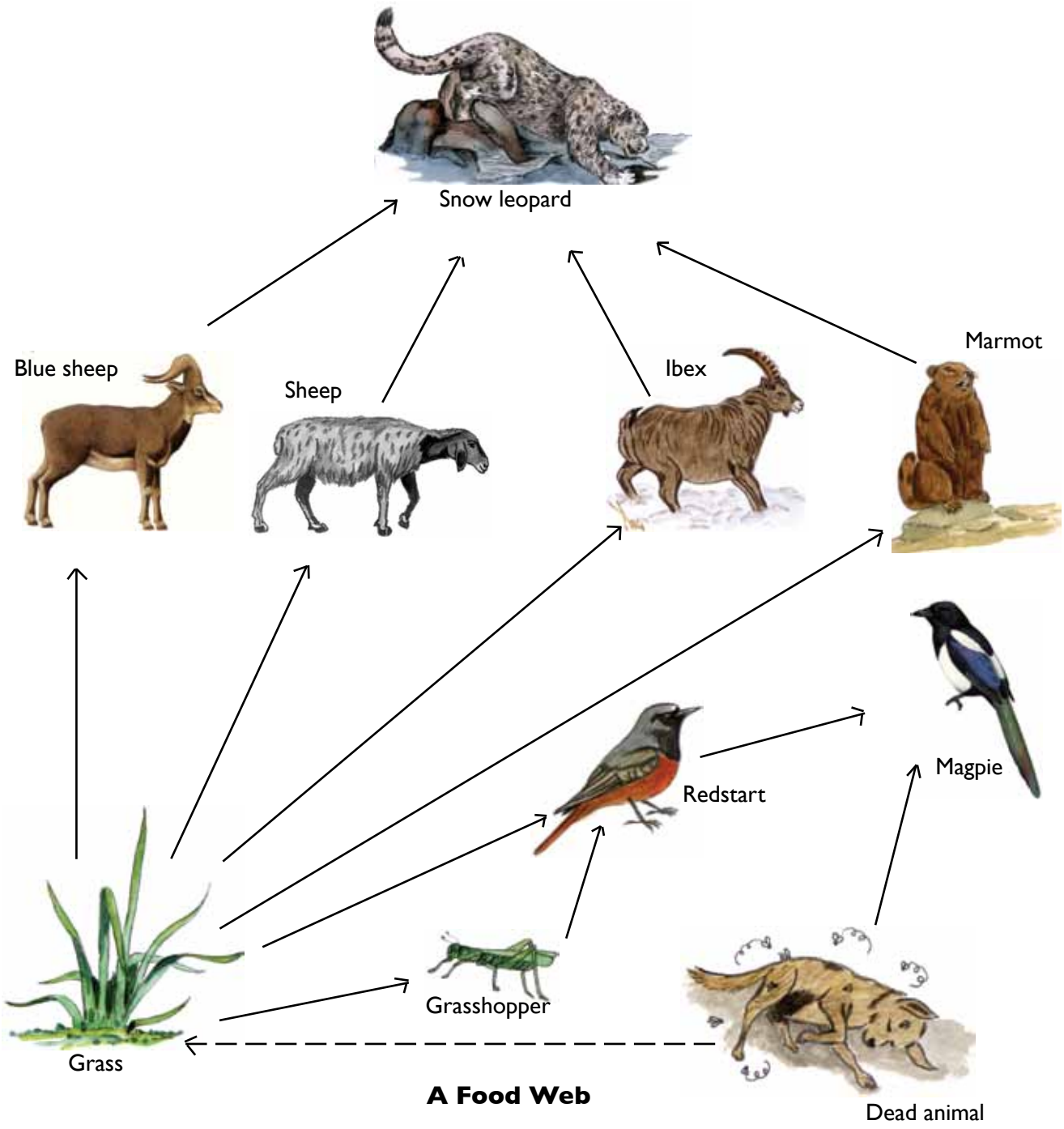
Snow leopards are at the top of the food web in these high mountains. As the snow leopard eats more than one kind of animal, there are many food chains with the snow leopard at the top within the food web.

To complete the food chains below, write down the names of some animals snow leopards eat.



Thus, one kind of animal may belong to several different food chains.

The food chains in any area link together to form a food web. Look at the example of a web given below.



A Food Web

As you can see above, even dead plants and animals are part of the web of life. When they die, bacteria and mould help turn them into soil. This happens slowly, but later new plants will grow from this soil. Grass-eating animals will then eat these plants.

If any part of the food web is removed, it can affect many animals. For example, villagers sometimes kill wolves which attack their sheep and goats. If all the wolves in an area were killed, then the number of marmots would increase. These marmots would eat up all the grass and then there would be little food left for the other grass-eating animals like the blue sheep and the ibex. These grass eaters would then have to move to other areas and some of them might die. The snow leopard would then have less food to eat. This may result in the leopard attacking more goats and sheep in the village. Thus, every plant and animal has an important role to play in the food web.

Play the web of life game. (Instructions are given in the *Notes for the Teacher*)

Protected Areas

Kunzang's heart beat fast as she heard the loud cry of one of the goats that she had taken out to graze. When she turned to look, a snow leopard was already carrying the poor goat away. She threw stones hoping to frighten the leopard, but it was too late. The leopard dragged the crying goat up the steep mountain slope.

That night the villagers held a meeting to discuss the attack by the leopard. This had been the third attack in the past few months. The young men of the village spoke angrily.

"Kill the snow leopard! It will only destroy us!" said one of them.

"Let's put some poisoned meat in the mountains where it lives," said another.

"Yes! Let's do that!" said a third.

As the voices of the people grew louder, Tashi Dorje, Kunzang's uncle stood up. He was one of the wise men of the village. Everyone quietened down, and he began to speak. "Today, we are all sad at what happened. However, let's look at what has happened to the snow leopard over the past many years. Snow leopards lived in these mountains, eating blue sheep and ibex, their favourite food. But over the years, many changes have taken place."

"What changes have taken place, *Azhang-ley*?" asked the young people.

"Well, people killed a lot of wild goats and sheep for their horns, their meat, and sometimes just for fun. People who came from outside Ladakh did a lot of the killing. Our villages have also become bigger. We keep many more animals now, and take them grazing to the same lands where wild animals graze."

"Were there more wild animals before? Have our sheep and goats taken over their grazing lands?" asked Kunzang.

"Yes," answered Tashi, "there were! Ladakh had huge numbers of animals like the ibex, the antelope, the argali, and the urial. Today, there are very few left! Because the number of animals has gone down, the government made certain areas "protected."

"What is a protected area?" asked someone.

"When the government decides that an area is protected, it means that all animals and plants found there are allowed to live. No one is allowed to cut a tree or kill an animal in a protected area. Our Hemis National Park is one of them."

"You mean our village is inside a protected area?" asked the young people.

"Yes, it is," said Tashi.

"But what should we do when snow leopards, and wolves carry away our goats and sheep?" cried a young boy. "Remember how a snow leopard got into the corral next to Dorje's house last year? It killed all his fifty goats that night."

A corral with a high wall

"Yes, of course I do. It was terrible. That's why we must make the walls of our corrals higher and put a mesh covering over them. I heard that the villagers of Skyu and Kaya have done this. No wild animals can jump into their corrals at night. We must do the same-then the leopards won't find food in our village and will go away. We won't have to kill them. Let's also see if we can graze our animals in different areas from where the wild animals graze. To do this we will need more grass and grazing lands for our animals. We need to think of how we can do that."

"Yes, let's meet again this week to talk about it," said one of the young men.

"Yes, we must," said everyone. As Tashi walked back home that night, he said, "Kunzang, we humans will have to think of ways to solve our problems without harming wild animals." Kunzang replied, 'Yes, *Azhang-ley*, I am sure we can think of something at our next meeting."

What is a Protected Area?

Hemis National Park

Over the years, many plants and animals have become extinct. This means that not even one individual of that animal or plant remains alive on earth. One of the main reasons for this is the activity of human beings. Some animals have been killed for their meat, skins, or for sport. Their habitats have also been destroyed leaving them with nowhere to live.

An animal or plant's habitat means the kind of place where it lives, for example forests, grasslands, mountains, seas, lakes or rivers. We must protect these areas if we want the remaining animals and plants to survive.

The government has made certain areas "protected" to save the habitats of these animals and plants. The two main types of protected areas are called wildlife sanctuaries and national parks. Many plants and animals would have become extinct a long time ago if the local people had not protected them.

The main aim of protected areas is to reduce or stop human activities that could cause damage to the animals and plants or their habitats. If an animal or plant becomes extinct, then we have lost it forever! This is a loss for everyone.

Look at this picture of a valley. People and wild animals live in the same area. However, the people are facing problems because of mistakes they have made.

1) Describe what you see. Can wild animals cause problems for the villagers?

2) Discuss ways the villagers can reduce attacks on their domestic animals without harming the wild animals.

EXERCISES

I Answer the following in a sentence or two:

1. Stanzin believes that plants are not part of the web of life. He thinks that if all the plants were destroyed, most animals would still live. Do you agree with him? Give your reasons.
2. n the story about protected areas we learnt that some wild animals have been killed in Ladakh. Why were they killed?
3. What were the different solutions discussed by the villagers to protect their animals from the snow leopard?

II Fill in the blanks choosing the right word:

1. An animal that does not live in Hemis National Park is the _ _ _ _ _ _ _ _ .

   (fox, wolf, lion, snow leopard).
2. A Protected Area is a place where _ _ _ _ _ _ _ _ (nobody, everyone) is allowed to cut a tree or kill an animal.
3. Many food chains in a community link to form a _ _ _ _ _ _ _ _ (National Park, food web, balanced diet).

III Choose the right answer:

1. Which of the following is given by Kunzang's uncle as a reason for the snow leopard attacking their animals?

   (i) men attack and try to kill the snow leopard

   (ii) the number of snow leopards have increased

   (iii) The villagers keep more sheep and goats these days
2. Some of the villagers wanted to kill the snow leopard because _ _ _ _ _ _ _ _ .

   (i) the marmots were eating up all the grass.

   (ii) the snow leopard was eating up all the grass.

   (iii) the wolves were eating their sheep.

   (iv) the snow leopard was attacking their sheep.

3. An animal that is not part of the web of life _ _ _ _ _ _ _ _

   (i) is a marmot;

   (ii) is a human being

   (iii) is an argali

   (iv) is a fox

   (v) does not exist

IV Make a food web using the following:

argali wolf grass hare grasshopper lizard eagle

(You can make a drawing of each of these to show the web)

Things to do

1 Discuss the kinds of animals that live in the area of your village. Ask your parents and grand parents if there were any differences in the past. What do you think might be reasons for the changes?

2 Are any of the local animals in danger? For what reason? How could people help protect them?

VOCABULARY

web of life	བཅའ་བྱ་ལུ་གུ་རྒྱུད། བཅའ་བྱ་འབྲེལ་ཏེ།
central	དགྱིལ་གྱི། གཞུང་གི
steep	གཅར་པོ། ཕྱེ་ཀ།
vulture	བྱ་རྒོད། (སེམས་ཅན་གྱི་རོ་ཟ་མཁན་གྱི་ཁྱབ)
eagle	ཁྱབ་རྣག (སེམས་ཅན་གཟུང་མཁན་གྱི་ཁྱབ)
dependent	གཞན་ལ་རག་ལས་ཏེ། བརྟེན་ཏེ།
link	འབྲེལ།
to drag	དྲུད་དེ་འཐྲེད་བྱས།
corral	ལྷས། ར་ལུག་སྐར་དེ་འཛོར་ས། སྐ་ར།
mesh	དྲ་མིག (ཧ་ཅི)
extinct	རྒྱུད་ཆད་ཏེ་མེད་མཁན།
habitat	འདུག་ས། གནས་ས།
to destroy	མེ་གཏོར་བྱོ་བྱས། ཞེ་གཏོར་བྱོ་བྱས།
park	སྐྱེད་ཚལ། སྐང་ཐང་།

Notes for the Teacher

Chapter 10: Air and Air Pollution

Why this chapter?

Air surrounds us and is essential for life on earth. It cannot be seen, but children are made aware of its presence and properties in this chapter, through various simple experiments. A brief recapitulation of the uses of air is included.

The phenomenon of air pressure is dealt with in relation to altitude and the low air pressure in Ladakh. This dispels a common belief that the symptoms caused by low oxygen at high altitudes is a result of herbs that grow there.

The second section deals with some causes of air pollution and some ways to reduce it. It deals with the situation in Ladakh, particularly in the towns.

Global warming is also a form of air pollution. It is mainly caused by burning any kind of fuel. Scientists report that the glaciers in the mountains all over the world are already decreasing in size due to global warming, which may result in serious water shortages. Scientists also say that global warming may make storms and droughts unpredictably worse in different places.

The smoke and the gases emitted from any kind of combustion, for example in vehicles, factories, etc. goes up and accumulates in the atmosphere. This layer of carbon dioxide acts like the polythene of a green house and allows incoming radiation from the sun but does not allow the resulting heat to escape from the Earth. This leads to the rise in temperature called global warming.

If we reduce the burning of fuel to heat our houses and instead use greenhouses for heat, it can help reduce global warming! So greenhouses help us against the greenhouse effect.

If possible, invite a guest speaker knowledgable about environmental issues, who could come and talk to students about the pollution problems specific to Ladakh. Often children are enthusiastic to start a clean-up campaign, and this should be encouraged.

Points for Discussion/ Clarification

The section on air is largely activity-based so that the children have opportunities to explore everyday phenomenon related to air. Hence, it is important that every experiment be carried out in class.

After doing an experiment or demonstration, encourage children to share their observations and give reasons for what they see. This develops their observation and analytical skills.

This chapter is only an introduction to the ways in which human activities negatively affect the atmosphere. You can encourage discussion on the lifestyle changes that are taking place in Ladakh due to various reasons, and their influence on the environment.

Materials Needed

For the activities you will need:

- a pan of water
- a bottle with a narrow neck
- some thin paper
- a lump of soil from the fields
- a glass
- balloons.

Chapter 10
AIR AND AIR POLLUTION

It's everywhere and all around,
It's inside us and underground.
Sometimes you can hear it,
Sometimes you can feel it,
And sometimes you can see it move things about.
Yet you can never hold it or see it.
You cannot live without it.
What is it?
Air!

Air is all around us. It is everywhere. Since air has no colour or smell, many things may look "empty" or seem to have nothing in them. Let's see if "empty" things are really empty, or whether they contain something

A) You will need a pan of water and a clear plastic bottle.

Step 1: Fill the pan with water. Push the bottle, mouth down, into the pan of water. What do you find?

Step 2: Now tilt the bottle a little. What happens? Was the bottle really empty?

Step 3: Push the bottle down into the water and then squeeze it. What happens?

Step 4: Push some dry paper into the bottom of a glass, so it won't fall out. Turn the glass upside-down and push it straight down under the water. Don't let it tilt! Then pull it straight up out of the water. Is the paper wet or not?

B) Take a lump of soil from a field and put it into a glass of water.
What comes out of the soil? What does this show?

In experiment A, step 1, air prevented water from entering the bottle. In step 2, when you tilted the bottle some air escaped as bubbles and a little water entered the bottle. In step 3 air was pushed out of the bottle when it was squeezed. When the bottle returned to its original shape after the squeezing stopped, water entered the bottle to replace the air that was squeezed out. In step 4, air filled the glass so water could not enter.

Experiment B shows that air is even found in the spaces in the soil.

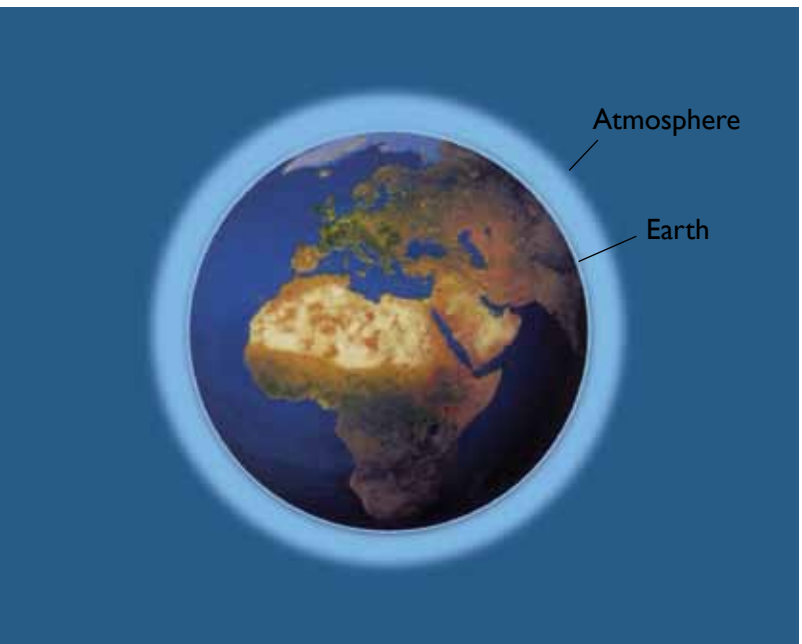
The above experiments show that air is everywhere around us.

Air is a mixture of gases including oxygen, carbon dioxide, nitrogen, etc. The largest portion of air is nitrogen. Air also contains water vapour, dust particles and pollutants.

This bunch of balloons shows the proportions of the different gases in the atmosphere: blue balloons are nitrogen, the red ones are oxygen, and the single white balloon is for all the other gases.

All animals need oxygen to breathe. During the process of respiration, they give out carbon dioxide. During photosynthesis green plants use carbon dioxide and give out oxygen. In this way the amount of oxygen and carbon dioxide in the atmosphere is maintained.

Did you know that even fire needs oxygen? When anything burns, oxygen is used and carbon dioxide is given out.



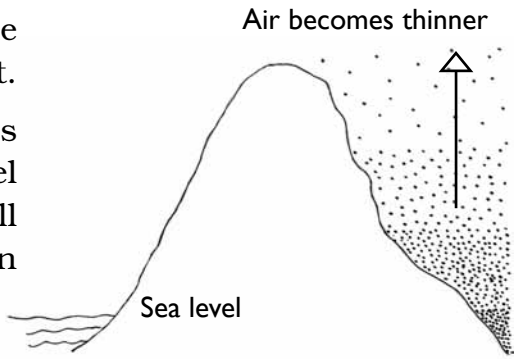
Properties of air

We have learned earlier that air occupies space. Now, let's learn about another property of air.

Air exerts pressure

Air covers the earth like a blanket. It extends above the earth's surface for many kilometers. This layer of air is called the atmosphere.

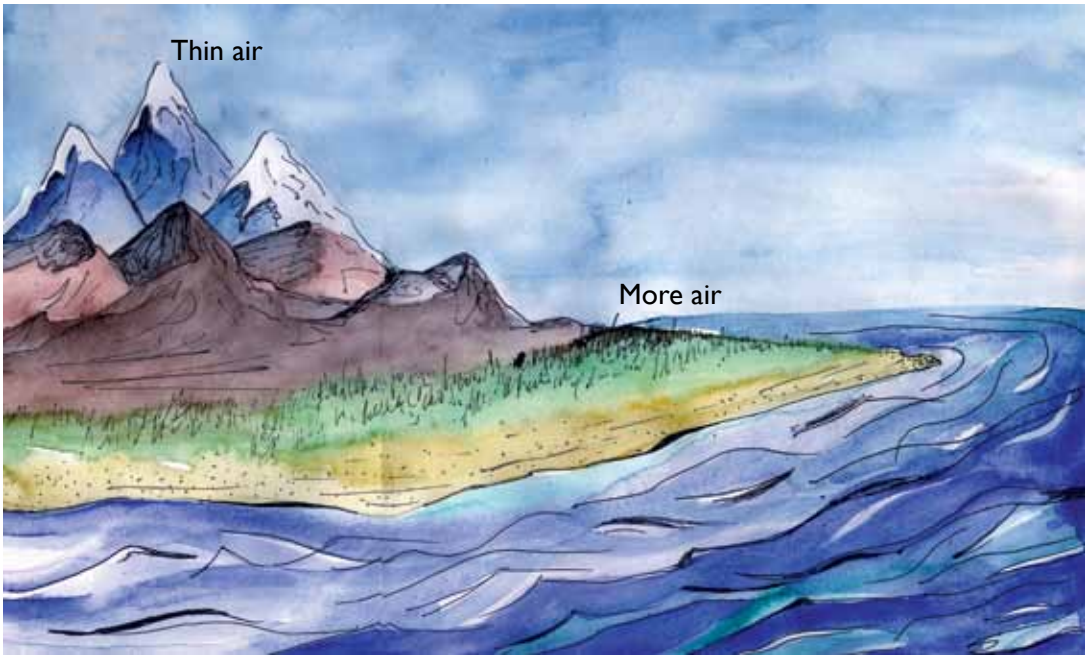
All this air presses down on the earth's surface. In general air pressure is most at sea level. This is called the atmospheric pressure at sea level. The reason air has pressure is because air has weight.



This diagram shows how as we go upwards from sea level, the air is thinner. Down at sea level the air is pressed together so there is more of all the gasses in a given volume of air at sea level than at high altitude.

Air pressure at high places

Places that are high in the mountains have thinner air. This means that there is less gas, including oxygen, in the same volume of air. People who live in high places get used to this. Changes happen in our lungs and blood so that our bodies can get enough oxygen. But when people from lower places like Delhi and Jammu travel to high places they may feel giddy, breathless, or get a headache for the first few days. This is because there is suddenly thinner air and less oxygen. They should rest for one or two days till their bodies get used to breathing thinner air. A few people can even get seriously ill at high altitude.



If you have travelled to very high places like Khardong-la, you may have felt such problems. This is because Khardong-la is 18,380 feet above sea level, much higher than Leh at 11,500 and Kargil at 8,750 feet above sea level. If you feel these symptoms, you should rest. But if the symptoms become worse, you should move to a lower altitude immediately.

People who climb very high mountains like Mt. Everest (29,028 feet) usually carry cylinders of oxygen. At such great heights there is very little oxygen to breathe.

Air pollution

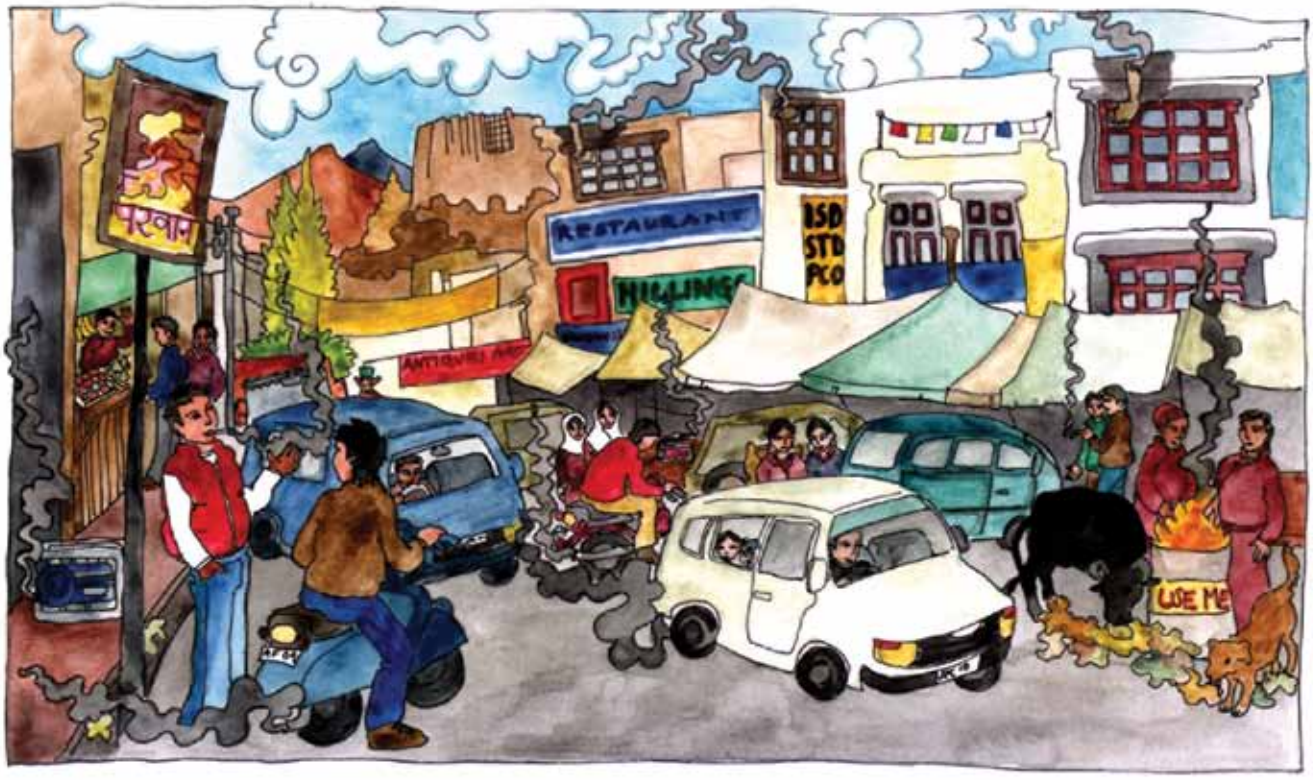
You have learned about water and land pollution. What is pollution?

Pollution is any change in our environment that harms living things. Human activities are the major cause of pollution. When we burn fuels such as wood, petrol, diesel, cow dung, coal, or rubbish, especially plastic, many substances including gases, smoke and tiny bits of dust get into the air. Some of these things can't be seen. However they are harmful to living and some non-living things.

In humans, polluted air can irritate eyes and cause headaches, tiredness, breathing problems, serious lung disease and cancer.

When any fuels is burnt, carbon dioxide is produced. The amount of carbon dioxide in the atmosphere has increased in the last 100 years and is causing the earth to get warmer. This is called global warming. It is causing changes in the weather in different parts of the world. For Ladakh the most dangerous effect may be that the glaciers are becoming smaller. Because global warming may cause so many problems in the world, people are trying to find ways to reduce the use of fuel.

Can you find five ways that air is being polluted in the picture below?



Fossil Fuels

Fossil fuels are formed from the remains of plants and animals that have been buried under the ground or the sea for lakhs of years. Examples of fossil fuels are coal, petroleum oil, and natural gas. You may have seen coal being used in *bokharis*. We get kerosene, petrol, and diesel from petroleum oil.

Digging coal from under the ground

Do you know how we use fossil fuels? Find out and fill the chart below. For each fossil fuel fill in as many uses as you can find out.

Fossil fuels	How we use it
Coal	
Kerosene	
Diesel	
Petrol	
Natural Gas	

As you can see, we use a lot of fossil fuels in our daily lives. These pollute the air and add to global warming. Therefore we have to find ways to reduce the use of fossil fuels.

How to reduce air pollution

The best way to reduce air pollution is to use other sources of energy that do not pollute as much as fossil fuels. We can also reduce the use of fossil fuels by following some simple methods in our daily activities.

Other sources of energy

There are other sources of energy that do not pollute as much as fossil fuels do. These are the sun, water, and wind.

Sun

When we warm ourselves in the sun, we use the sun's energy, which is called solar energy. This energy can be used for cooking, heating, and electricity. Solar panels change the energy of sunlight into electricity. Ladakh is a good place for solar energy because it's a desert so most days are sunny and it's high altitude so the air is thin and clear.

Look at some of the uses of solar energy.

Solar lamp

Solar cooker

South facing solar-heated house

Water

Flowing water has energy which can be used. A water mill uses the energy of flowing water to turn a heavy-stone to grind grain. In many places in Ladakh prayer wheels are even turned by stream water.

Water mill

Prayer wheel turned by water

We can also generate electricity from flowing water. This does not pollute the air. It is called hydro-electricity. The biggest hydel projects in Ladakh are at Stakna and Kargil town. Do you know any hydel-project in your area?

Wind-powered electricity

Wind

People can also get energy from the wind where it is strong and blows continuously. In Ladakh wind power is not used much because the wind does not blow continuously and the air is thin here at high altitude.

Ways to reduce the use of fossil fuels

Look at the list of uses of fossil fuels that you made in the previous activity. Group them into the four categories given below.

The best way to reduce air pollution is to reduce the use of fuels. A few suggestions on how we can do this in the four categories are given below.

FUEL	COOKING	HEATING	TRANSPORT	ELECTRICITY
Kerosene				
Coal				
Diesel				
Petrol				
Natural Gas				

Cooking

1) If we cover cooking pots with a lid, the food cooks faster. This is because it does not allow the steam to escape. A pressure cooker also reduces fuel by cooking food faster.

2) Before cooking pulses, soak them in water overnight. This makes them cook faster.

Heating

As you learnt in class 4, the best way to reduce the use of fuel for heating in the winter is to make buildings that remain warm in winter. Can you remember? What are the main points in making a house warmer without burning fuel?

Transport

Which do you think pollutes more: forty people travelling together in one bus or forty people driving forty separate cars? That's why people who want to reduce pollution take the bus, use bicycles, or walk.

Electricity

Do you ever see electricity being wasted?

Switch off lights, TV, radio, and other machines when not in use.

Did you know that it takes much more electricity to make heat than light? So the old style light-bulbs, which get very hot, use much more energy than CFL bulbs, which don't get so hot. Leh Hill Council has decided that only CFL bulbs should be used, so that there will be enough electricity for everyone.

A CFL bulb saves energy

EXERCISES

I Answer the following questions:

1. Describe a simple experiment to show that air is present, even though it cannot be seen.
2. What is air made of?
3. Why is air important for living things? Which part of air is used by animals during respiration?
4. What is atmospheric pressure? What happens to the air as we go upwards from sea level?
5. What is air pollution? Mention the harmful effects it has on living things.
6. Mention three methods to reduce air pollution.

II Choose the correct words and fill in the blanks:

1. _ _ _ _ _ _ _ in the air is used by all animals to breathe. (oxygen, carbon dioxide)
2. During the process of photosynthesis, green plants use _ _ _ _ _ _ _ and give out _ _ _ _ _ _ _ . (oxygen, carbon dioxide)
3. As you go higher up a mountain, the atmospheric pressure _ _ _ _ _ _ _ .

   (increases, decreases)
4. We cannot _ _ _ _ _ _ _ the air. (see, feel)
5. When we burn things, _ _ _ _ _ _ _ is used and _ _ _ _ _ _ _ is given out. (oxygen, carbon dioxide)

III Mark True or False. If false, write the correct statement:

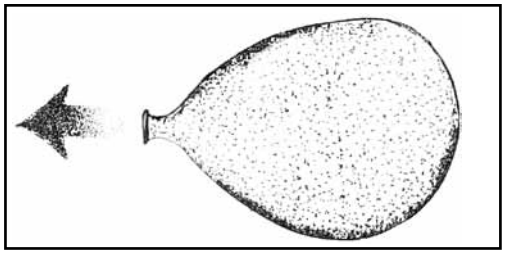
1. Atmospheric pressure is high at sea level.
2. Use of fuels like wood, petrol, diesel, cow dung, and coal can reduce air pollution.
4. Watermills pollute the air.
5. There is more oxygen at high places.

IV Give reasons why:

1. Bubbles come out when a lump of soil is put in water.
2. If a burning candle is covered by a glass, it soon goes out.
3. People who travel to high places often feel giddy or get headaches.
4. Cooking on kerosene causes more pollution than a solar cooker.
5. We should cover vessels while cooking.

Things to do:

A balloon rocket



All you need is a balloon. Blow up the balloon, hold it high in the air, then let it go. What happens?

When the compressed air inside the balloon rushes out, it pushes the balloon in the opposite direction.

This principle is used in jet planes.

VOCABULARY

to tilt	སྒྲུ་བྱེད། ཡོན་ཏེའ་གཏང་བྱེད།
to wipe	ཕྱི་བྱེད།
a lump of soil	ས་རྡོག་རྡོག་ཅིག
to squeeze	བཙིར་བྱེད།
portion	ཁག
vapour / steam	ཁས་ལྫྷང་ས། ཉང་ས། ལྫྷང་ས་ལ།
properties of air	ལྫྷང་པོའི་ཁྱད། ལྫྷང་པོའི་ཁྱད་ཆོས།
to occupy space	གནས་ས་བཀག་སྟེ་ཡོད་བྱེད།
to exert pressure	ཤེད་གཏང་བྱེད།
giddy	མགོ་ཡོང་འཁོར་བྱེད་བྱེད།
symptom	ནད་རྟགས།
to irritate	སྐྱང་བ་མཆོར་བཙུག་བྱེད། བར་དོ་བསྟན་བྱེད།
fossil fuel	ས་འོག་ཡང་ན་སའི་གཡོག་ནས་འཕེང་བའི་སྐྱམ་རིགས་དང་རྡོ་སོལ་སོགས།
to grind	འཇག་བྱེད།
to escape	འཕེང་སྟེ་ཐོར་བྱེད།
flame	མེལ་ལྷུག
rubbish	བྱིམ་ས་ཚག་ཆོག

Notes for the Teacher

Chapter 11: The Changing Faces of the Moon

Why this chapter?

In class 4 students were introduced to some celestial bodies clearly visible in the night sky. In this chapter the phases of the moon are described in more detail. The moon is our closest neighbour. It is clearly visible many nights and days of each month, and students may have wondered why it appears to change shape. This lesson helps them understand that the shape of the moon stays the same. It only appears to change because of its position in the sky, which is constantly shifting relative to the earth and the sun.

The fact that the different phases of the moon are closely linked to the Muslim, Tibetan and Buddhist calendars gives this chapter a relevance in our daily and cultural lives. Many festivals are based on specific phases of the moon. Ask students which local festivals they know about, and help them figure out which calendar each belongs to. If there are any festivals around the time the class is reading this chapter, be sure to relate the festival to the chapter.

Points for Discussion/ Clarification

Most children have already seen the moon in its different phases. It is important to start the lesson by encouraging your students to share their observations. Some students may have been more observant than others, and such sharing may trigger an interest in the other students to look at the night sky.

Since the reasons for the moon appearing to change its shape may be difficult to grasp, the activity with the ball must be done. This will give students a visual reinforcement of the concept. You could also use the apparatus showing the phases of the moon provided in the social studies kit in school. Or, you can do the demonstration given in the text in a darkened room using a light source.

Discuss with the students how festivals celebrated according to the international calendar always fall on the same date on that calendar (e.g. Independence Day is on 15th August). But festivals or holidays calculated according to lunar calendars will differ from year to year. This is because the lunar month does not match the 30 or 31 day month of the international calendar.

The lesson includes a month-long activity where students have to record the shape of the moon that they see everyday. Begin this activity when beginning this chapter, and check with the students every few days to see what they have observed. Try to make sure that the students do the exercises, and at the end of the month, spend some time looking at their observations. This could be followed with a revision of the lesson, this time based on the student's observations.

Additional information

Lunar months do not add up to an exact solar year (365-366 days). The Tibetan, Buddhist calendars have some days missing and some days doubled to keep in synch with the seasons. The Muslim months rotate through the seasons.

Materials Needed

For the activities you will need either the apparatus given in the school kit, or:

- a ball or a round stone
- a light source
- a dark room (cover the windows with blankets or shawls).

Chapter 11
THE CHANGING FACES OF THE MOON

Nono Ukpa was puzzled. Every night as she flew out to look for mice and baby snakes, she would see the moon up in the sky. But it seemed to have a different shape every night.

"Sometimes it looks like a bright circle like this."

"And sometimes it becomes smaller like this. Why can't the moon make up its mind about what shape it wants to be?" thought the little owl.

Do you agree with Nono Ukpa? Have you seen the moon's shape changing? In the space below draw the shapes that you have seen.

Nono Ukpa decided to ask *Acho Tsanbi,* the bat, about the changing shapes of the moon. Acho Tsanbi, like Nono Ukpa, slept all day and was active at night. "He would know," thought Nono Ukpa, "as he sees the moon every night too." He found Acho Tsanbi on a fruit tree.

"Acho Tsanbi, why does the moon keep changing its shape every night?" asked Nono Ukpa .

"It doesn't," said Acho Tsanbi. "The moon is shaped like a big ball."

"But it does change shape! I see it with my own eyes!" said Nono Ukpa.

"No, it doesn't. The moon is a huge ball of rock with no water or air on it. Nothing can live on it. It does not even have its own light. The moonlight that we see is actually the sun's light shining on the moon. Every night we see only the part of the moon that is lit by the sun. The rest of the moon is too dark to see, but it's there!"

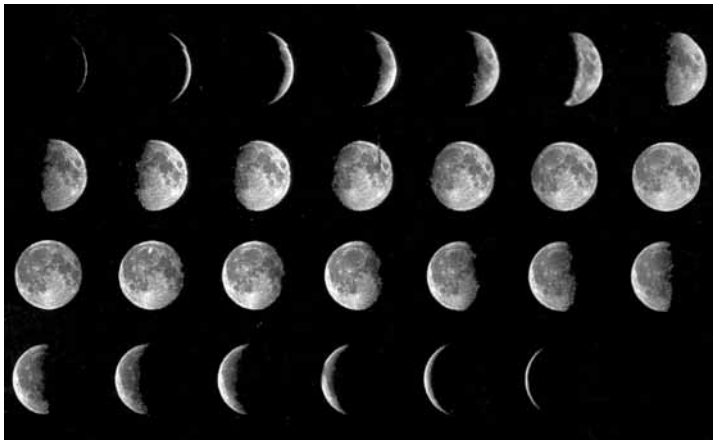
Crescent moon

"But how do you know it's there?" asked Nono Ukpa.

Acho Tsanbi explained, "If you look at the moon just after sunset when it is a crescent, sometimes you can see the rest of the circle faintly. That shows that the moon's shape is like a ball all the time."

"But why does the sun light up different parts of the moon on different nights?" asked Nono Ukpa.

"Ah! That's a good question. Let me explain. While the earth moves around the sun, the moon is also moving. It goes round and round the earth all the time."



The moon as it looks on different days and nights

"How long does that take?" asked Nono Ukpa.

"The moon takes about a month to go around the earth once. So depending on where the moon is in the sky, we may see some part of the moon, one whole side of the moon, or no part of the moon lit up by the sun. That's why we see a different shape every night."

This activity should be done early in the morning on a day when there is bright sunshine, or do it in a darkened room with a light source such as a light bulb, lantern or bright candle.

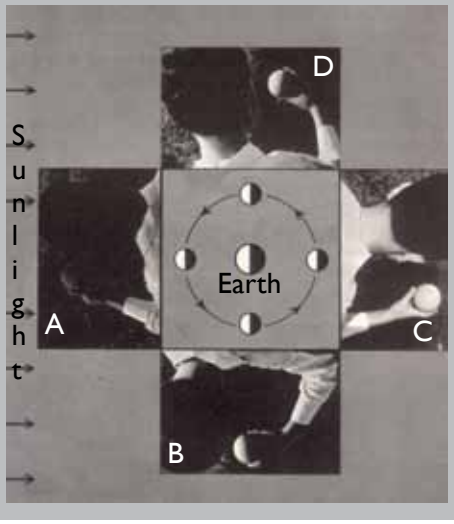
Take a small ball or a round stone. Imagine your head is the earth and the ball is the moon circling the earth. Stand facing the sun.

WARNING: Never look at the sun directly. It can damage your eyes.

Hold the ball in front of you. Its dark side will be towards you. This is what happens when the moon is at "A" in the drawing. It is called the new moon. On new moon, you can not see the moon at all.

Now stand with the sun to your right. Only the right half of the ball catches the sunlight. This happens when the moon is at "B" in the drawing. This is called first quarter, and the moon looks like a half-circle.

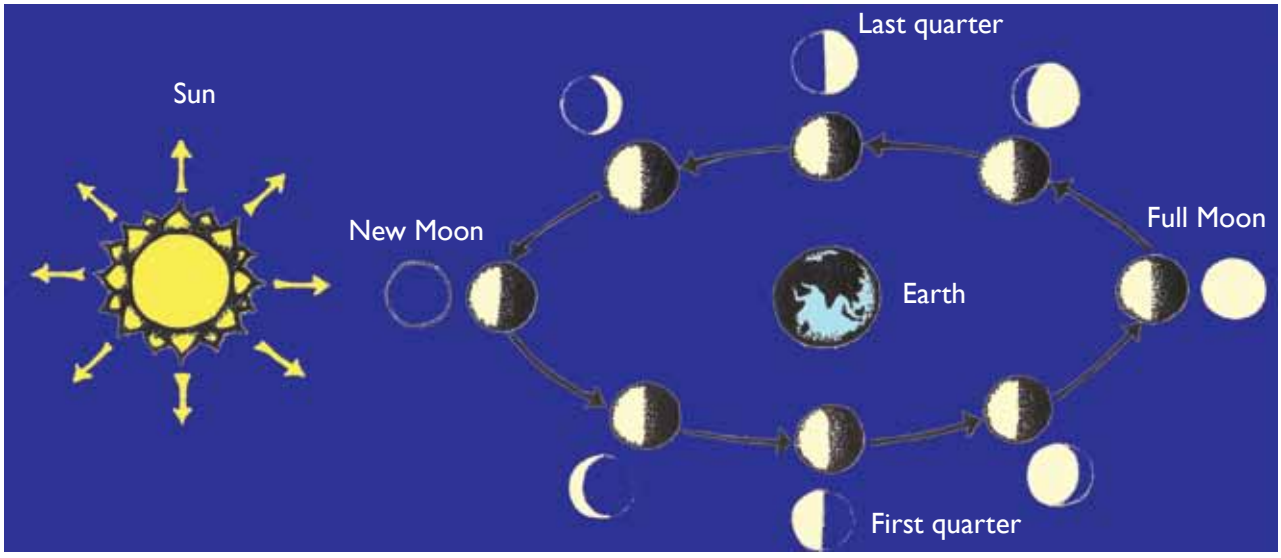
Now stand with your back to the sun and hold the ball in front of you where the sun shines on it. The lit up side will be towards you as shown in "C" in the diagram. This is called the full moon, and it happens when the moon is halfway around its path. On full moon, you see the moon as a bright circle.



Now stand with the sun to your left. The left half of the ball will be lit up. This happens when the moon is at "D" in the drawing. This is called the last quarter.

Finally after a month, it will be new moon again and everything is repeated.

Fourteen or fifteen days pass between the new moon and the next full moon. It takes another 14 to 15 days from this full moon to the next new moon. In this way, the moon takes 29 to 30 days from one new moon to the next new moon. During this time it completes one cycle around the earth.



Phases of the moon: The inner circle is how the moon would look from space; the outer circle is how the moon looks from the earth.

Solar calendar

The most commonly followed calendar in the world nowadays is the European calendar. This is a solar calendar because it is based on the movement of the earth around the sun. It has about 365 days in a year, and each year is divided into 12 months, which we call January, February, etc.

Lunar calendars

However, different cultures have different calendars. The Muslim, Tibetan Buddhist, and Hindu calendars are based on the movement of the moon around the earth. so they are called lunar calendars. Many important festivals are celebrated according to the different lunar calendars.

Id-ul-Zuha and *Id-ul-Fitr* are important celebrations for Muslims. These are calculated every year according to the Muslim lunar calendar. Both *Ids* are celebrated on the first sighting of the moon after the new moon.

Ladakhi Buddhists call the new moon day *Namgang* and the full moon day *Chonga.* The Tibetan date of Buddha's birth, enlightenment and death is in the 4th month of the Tibetan calendar, but the rest of India usually celebrates Buddha Jayanti one month earlier. Both are on full moon days. Ladakhi *Losar* is always on a new moon, so the lamps along the windows of houses look very bright in the dark.

Diwali, the Hindu festival of lights, also comes on a new moon day. It is calculated according to the Hindu calendar.

EXERCISES

I Answer the following questions:

1. When you see a whole side of the moon shining brightly, what do you call it?
2. What is the new moon?
3. Why is there no life on the moon?
4. How many days pass between one full moon and the next?
5. Name any two festivals that fall on or just after new moon days.

II Fill in the blanks with the words given below:

solar 365 earth 30 lunar moon

1. The moon goes around the _ _ _ _ _ _ . It takes about _ _ _ _ _ _ days to go around.
2. The earth takes about _ _ _ _ _ _ days to go around the sun.
3. The calendars based on the movement of the _ _ _ _ _ _ _ around the earth are called lunar calendars.
4. The calendar based on earth's movement around the sun is called the _ _ _ _ _ _ calendar.
5. The Tibetan, Muslim and Hindu calendars are _ _ _ _ _ _ calendars.

III True or False? If false, write the correct statement:

1. The moon has light of its own.
2. The moon changes shape.
3. It takes almost 30 days from the beginning of one new moon to the next.
4. There is air and water on the moon.
5. The earth does not move at all.

Things to do

Look for the moon every night and day for one month. At some times of the month you will see the moon in the daytime and not at night In the chart on the following page, note the date and time, and draw the shape of the moon that you see. Then answer the following questions:

Month: .....

Sun	Mon	Tue	Wed	Thu	Fri	Sat
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

1. On which date or dates did you see a very thin crescent moon?
2. On which date or dates did you see a half moon?
3. On which date or dates did you see a full moon?
4. On which date or dates did you see the moon in the daytime?
5. Were there any days when you could not find the moon at all?

VOCABULARY

to be lit	འོད་ཟེར་བྱུང།
faint	སྣབ་སྲིབ་ཅིག་མཐོང་མཁན།
quarter	བཞི་ཆ་གཅིག བཞི་པིང་།
lunar	ཟླ་བ་དང་འབྲེལ་བ།
solar	ཉི་མ་དང་འབྲེལ་བ།
enlightenment	སངས་རྒྱས་པ།
calendar	ལོ་ཐོ།
to make up one's mind	ཐག་གཅད་བྱས།